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A Quantitative Situation Analysis Model for Strategic Planning in Quantity Surveying Firms

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ABSTRACT

Quantity Surveying (QS) firms, like all organisations must continuously formulate and execute the strategies required to enable them to survive and succeed in a constantly changing business environment. Key challenges that firms are required to grapple with include the rapid pace of technological advances affecting professional practice, intense internal competition, and the struggle to attract and retain key talent. In the midst of these operation challenges, QS firm leaders must also dedicate resource to planning and executing strategy. Unfortunately, strategic planning in QS firms is often ad-hoc or neglected, and there is a distinct lack of frameworks and tools specific to the QS context.

This study set out to redress this gap in literature and theory, by providing firstly a framework of key factors to be considered in a situation analysis – the core activity of the Design School approach to strategic planning, and secondly to provide a quantitative model based on that framework to enable firms to diagnose their Strategic Health – that is, their current performance and areas for improvement and optimisation, prior to formulating, selecting and executing strategic options to achieve their mission and vision.

To achieve this, this study takes a multi-stage mixed methods approach. Firstly, following a review of the literature, in-depth semi-structured exploratory interviews were undertaken with key leaders in the Australian and New Zealand QS profession that led to the development of a situation analysis (SA) framework of 28 External Factors and 26 Internal Factors. Two stages of descriptive survey were undertaken (in 2013 and 2020) which enables the development of a quantitative Strategic Health model based on the framework Factors. Finally, the developed model was tested amongst five similar case

study firms. Based on the case study results the developed model correlates strongly with five self-reported measures of success.

The developed SA framework provides QS firms with empirically validated terms of reference when undertaking SA as part of their own strategic planning process. Due to the relatively small sample sizes involved, caution is urged in applying the developed Strategic Health model to situations outside of the population samples in the study.

Further testing of the model in larger population samples or in associated industries are recommendations for further research.

Keywords: quantity surveying, situation analysis, strategic health, strategic planning, Australasia

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Lastly, and most importantly, my thanks to my family. To my wonderful wife Amanda, thank you for your incredible patience, support and encouragement. You and our amazing daughters – Sofia and Isabella – are my inspiration!

DECLARATION

I have authored and contributed to a number of conference papers and journal articles during the course of this research project. For any sections of work from those publication that are incorporated into this thesis, the greatest input was mine.

The concept of Strategic Health as a quantitative SWOT-based tool for diagnosing the strategic potential of QS firms has its origins in a paper by Dr Jasper Mbachu as lead author and myself as co-author (Mbachu & Frei, 2011). Dr Mbachu and I developed the concepts described in that paper in collaboration and shared the penning of the article. Dr Mbachu carried out the pilot-study fieldwork described. However, the subsequent detailed review of the literature and theoretical underpinnings; the identification of gaps; the justification for this research; the designing of this research strategy, and; the undertaking of the fieldwork, analysis and writing up for this thesis is my own work.

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LIST OF ABBREVIATIONS

| | |
|--------------|---|
| AIQS | Australian Institute of Quantity Surveyors |
| ANZ | Australia(n) and New Zealand |
| BIM | Building Information Modelling |
| CQS | Consulting Quantity Surveyor |
| EF | External Factor |
| IF | Internal Factor |
| I(C)T | Information (Communication) Technology |
| n | number of observations in sample (for a given variable) |
| m | sample mean (for a given variable) |
| NZIQS | New Zealand Institute of Quantity Surveying |
| OH | Organisational Health |
| QS | Quantity Surveying (or Quantity Surveyor) |
| QS's | Quantity Surveyors |
| r | rank (generally in descending order of magnitude, with 1 being the highest, or in the case of threats and opportunities, beginning with the highest rated opportunity at 1) |
| RBV | Resource Based View (in strategic planning) |
| SA | Situation analysis |

s.d. sample standard deviation (for a given variable)

SH Strategic Health

SWOT Strengths, Weaknesses, Opportunities, Threats

LIST OF DEFINITIONS

| | |
|------------------------------|---|
| External Factor | any trend, action or event occurring outside of a firm's sphere of control, will generally either be a threat or opportunity |
| Follow-up Observation | the descriptive survey undertaken in 2020 |
| Internal Factor | any activity or resource inside an organisation's sphere of control, will generally either be a strength or weakness |
| Match ratio | the strength of relationship between the combination of a given External Factor and a given Internal Factor |
| Matching score | the total of all match ratios associated with a given Internal Factor |
| Opportunity | a helpful External Factor |
| Original Observation | the descriptive survey undertaken in 2013 |
| Situation Analysis | an approach employed in the Design School of strategic planning that involves an assessment of an organisation's internal resources together with and in reference to the factors in its external environment |
| Strategic Health | an organisation's ability to carry out the strategic actions required to achieve its mission and vision over the long term |
| Strength | an Internal Factor performed well |
| SWOT analysis | a tool applied to Situation Analysis that focusses on reviewing an organisation's Strengths, Weaknesses, Opportunities and Threats |

Threat

a harmful External Factor

Weakness

an Internal Factor performed poorly

1.0 INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Title

A Quantitative Situation Analysis Model for Strategic Planning in Quantity Surveying Firms

1.2 Rationale for the Study

1.2.1 Study Justification

The construction industry is the third largest contributor (of 31 industries) to New Zealand's nominal gross domestic product (GDP), contributing \$18.5 billion (Statistics New Zealand, 2019). The sector employs over 258,000 people, making up 10% of the national workforce (MBIE, 2020). In Australia, the industry generates revenue of around \$360 billion, contributing around 9% of GDP (AISC, 2021).

Quantity Surveyors (QS's) play a key role in the industry; tasked with managing the finances of projects, including estimation of costs and keeping projects on budget (Mbachu, 2011; NZIQS, 2020).

A central function of the QS's role, by definition, is the measurement and 'quantification' of costs of building projects. In this pivotal role, the effectiveness with which quantity surveyors perform their functions is argued to impact the efficiency of the industry and even the broader economy (Mbachu & Frei, 2011).

The need for change has been on the agenda for the construction industry globally following Egan's (1998) seminal rethinking construction report on the challenges facing the UK construction industry.

The report suggested that the construction industry was underachieving and put forward a challenge for the industry to undergo fundamental change in regard to its culture and work methods. A follow-up review (Wolstenholme, 2009) of progress in the UK since the circulation of Rethinking

Construction found that whilst some progress has been made, overall the industry had fallen far short of substantially achieving any of the stated agendas for change. According to Australia's 'Royal Commission into the Building and Construction Industry' (T. R. H. Cole, 2003), the situation in Australasia, specifically Australia, is equally critical. Cole reported that practice and conduct in the industry on a range of issues, including commercial and cost management aspects were deeply inadequate and that change was required. Improving shortcomings in the construction sector through addressing the concerns of the Egan and Wolstenholme (Crane & Saxon, 2020; Finch, 2019; Murray, 2016) and Cole (Loosemore, Alkilani, & Luperdi, 2021) reports remain on the research agenda – indicating that these challenges remain just as relevant today.

The Australian Institute of Quantity Surveyors (AIQS) commissioned a major study to inform its future strategic direction (AndrewsGroup, 2006). The study reported that Qs have found themselves in a disadvantaged 'low value' (p.199) position within the construction supply chain model. The report recognised the pressing need for the profession to actively engage its clients and move 'up the food chain' (p.200). This lack of profile and recognition of the quantity surveying (QS) profession is a key concern throughout Australasia (Frei & Mbachu, 2009; Smith, 2004) the improvement of which is recognised as a key objective issue by both the New Zealand Institute of Quantity Surveyors (NZIQS) and the AIQS alike. A primary goal of the AIQS is to raise the profile of the profession through building a globally recognized brand (AIQS, 2019). Similarly, 'increased credibility and influence' and 'increased relevance to industry' are two of the NZIQS's six targeted strategic outcomes (McKay, 2019).

Therefore, despite their pivotal role in successful construction project delivery QS firms' survival is under threat and requires appraisal of the current situation and the development of suitable competitive strategies in response to changes in the industry (N. Z. Abidin, Adros, & Hassan, 2014; N Z Abidin, Yusof, Hassan, & Adros, 2011; Adesi, Owusu-Manu, & Boateng, 2019; AndrewsGroup,

2006; Davis, Watson, & Man, 2007; Harun & Torrance, 2006; Mbachu & Frei, 2011; O'Brien, Mbachu, & Lomax, 2014; Ofori & Toor, 2012; Smith, 2004). Ofori and Toor (2012) even noted that the changes in the business environment were so adverse that they had “led many observers to predict, and many within the profession to fear, that quantity surveying might disappear as a formal profession” (p.38).

The sources of these threats are both from external competition from other professions (Wao & Flood, 2016) as well as intense internal competition between QS firms (Adesi et al., 2019; Ofori & Toor, 2012; Smith, 2004). At the same time, the business environment QS's operate in is facing rapid and significant change in terms of the complexity of project delivery and the expectations of clients (Shayan, Kim, Ma, & Freda, 2019; Smith, 2004).

In order to remain competitive and survive, QS firms must therefore seek to continuously improve and adapt in response to the challenges faced (N. Z. Abidin et al., 2014). Porth (2003) and Gillespie (2019) see creating value for customers, owners and employees as the hub that drives competitive advantage, success and growth of organisations. However, to achieve the set goals, the organisation must first be in a good strategic health condition. This is because strong positive correlation exists between the health status of an organisation and its performance. De Smet, Loch, and Schaninger (2007); De Smet, Palmer, and Schaninger (2007) corroborates this by providing empirical evidence that links good organisational health (OH) status to strong financial performance of about 600 companies drawn from across diverse industries. Organisations cannot be healthy in isolation: their functioning in their whole environment should be taken into account which includes looking at the wider external context within which they work as well as their internal functioning systems NHS (2009). The Design School literature (Andrews, 1971; Christensen, Andrews, Bower, Hamermesh, & Porter, 1982; Gillespie, 2019; Learned, Christiansen, Andrews, & Guth, 1965; McKiernan, 2017; Mintzberg, 2000; Tennent, 2020) underpin this, explaining that the way an organisation's strengths and weaknesses are matched with the external opportunities and threats drives the organisation's

success and long-term survival; hence his focus on the SWOT analysis as the centrepiece of the process of strategy formulation, implementation and review.

Numerous studies in various sized businesses across multiple sectors (Ahmadi, 2019; Chen, Widjaja, & Chen, 2017; Didonet, Simmons, Díaz-Villavicencio, & Palmer, 2012; Kumar, Jones, Venkatesan, & Leone, 2011; Subramanian, Kumar, & Strandholm, 2013) all found the need to pay attention to the effects of external influences when developing strategies aimed at performance improvement of strategic positioning. Without scanning and discerning future directions and actively preparing for any impending changes, Qs stand at a risk of receiving changes as threats, rather than opportunities. Investigation into the key strengths and weaknesses of the profession and the critical opportunities and threats it faces is a fundamental step in the strategic change management process (Andrews, 1971; Gillespie, 2019; Porth, 2003).

If QS firms were to reflect on the perceived opportunities and threats in their environment, as well as their internal strengths and weaknesses, they would be able to maximise the opportunities and minimise the imminent threats, as well as gain understanding of the most urgent areas requiring reengineering and improvement. Unfortunately, however, the literature indicates that strategic planning in QS firms tends to be rare and ad-hoc (Murphy, 2012, 2016). This is a phenomenon not constrained to QS firms. Despite there being widespread acceptance of the importance of strategic planning (according to one study of 60,000 managers and executives in over 140 countries, strategic leadership is the most important of 20 behaviours for leadership effectiveness (Kabacoff, 2014)), two thirds of managers report that strategy formation is poorly executed at their company and 43% were not even able to articulate their own strategy (in a study of 500 managers at 25 companies (Horwath, 2019)). Other studies have found that 90% of company leaders have received no formal strategic management training (Horwath, 2019).

Furthermore, there is no research that has been undertaken to summarise the various studies on the factors militating against QS firms to provide a framework of those threats – or the opportunities. Nor have any studies been undertaken to provide and test any quantitative (or qualitative) strategic health check tools specific to the Internal and External Factors relevant to QS firms. The lack of available tools to guide strategic thinking is not limited to the QS field. Research has found that a lack of training and tools is one of the key barriers to strategic planning for close to half of all business leaders (Horwath, 2019).

1.2.2 Justification for Selection of Australia Together with New Zealand as a Unified Region

The rationale for selecting Australia together with New Zealand as a unified region for the study is due to the similarities in the context and application of QS practice in both locations. Unlike locations in continental Europe and North America, where construction cost management is largely the domain of Cost Engineers (AACE, 2021) and Construction Economists (CEEC, 2021), in New Zealand and Australia this functioned is fulfilled by Qs (NZIQS, 2020).

The similarities and close relationship between Australia and New Zealand is widely acknowledged including at governmental level, underpinned by the two nations' shared histories, alignment of values and institutions and depth of interpersonal and cultural connections (MFAT, 2021). Both countries belong to the British Commonwealth and are members of the international Organisation for Economic Co-operation and Development (OECD). However, a key difference worth noting as relates to construction services (including quantity surveying) is the scale of the mining sector in Australia. Whilst relatively small in New Zealand, this sector rivals and even outperforms the construction industry contributing over 1.5 times the amount to GDP (11.5% vs 7.4%) as construction

(RBA, 2021). Nuances such as them may have an effect on the range of end markets QSs in both countries are able to apply their services to.

In practical terms however, the similarities far outweigh the differences. In recognition of the broadly similar operating environment and practices in both countries, the QS profession tends to identify Australia and New Zealand as a unified region. One example of this is the approach of large multinational built environment consultancies that provide QS services globally, and in all cases treat both countries as a unified region with a shared headquarters. For example, alongside a global headquarters, AECOM operates in seven distinct business regions, one of which is defined as ‘Australia and New Zealand’ – headquartered in Brisbane, Australia (AECOM, 2021). Similarly, Turner & Townsend (T&T, 2021) identify ‘Australia and New Zealand’ as one of the eight global regions it operates in. WT Partnership (WTPartnership, 2021) operate five regions globally, one of which is ‘Oceania’ which comprises offices in New Zealand and Australia only. RLB (RLB, 2021) also define their ‘Oceania’ region as being comprised entirely of 20 offices located across New Zealand and Australia.

This industry view of a combined Australia and New Zealand region is also shared in the generation and dissemination of research and the activities of both countries’ QS professional institutes. Academically, the annual AUBEA (Australasian Universities Building Education Association) is the main forum in the research calendar for sharing of research agendas, ideas and findings in the region and comprises attendees from universities across both New Zealand and Australia (Deakin-University, 2021). Published by the University of Technology Sydney, Construction Economics and Building publishes original research from New Zealand, Australia and internationally in various aspects of the economics and management of building and construction including quantity surveying (UTS, 2021). Due to the ANZ regional focus, the journal was previously known as the Australasian Journal of Construction Economics and Building (DOAJ, 2014).

In recognition of these commonalities, the AIQS and NZIQS are committed to a strategic alliance and Chief Executives of both respective organisations regularly attend the annual conferences of the other which includes the production of shared documents, publications and practice notes. Notable examples include: a shared template contract for quantity surveying consultancy services (AIQS, 2020); joint development and publication of the Australian and New Zealand Standard Method of Measurement (ANZSMM 2018) - a joint Australian and New Zealand industry guideline for the measurement of building works (AIQS, 2018), and; sharing of the AIQS Online Learning Academy (NZIQS, 2021) for continued professional development of members of both institutes. The Built Environment Economist (formally known as 'The Building Economist') is a quarterly publication produced by the AIQS (AIQS, 2021) with input from the NZIQS and provides industry articles and case studies from Australia, New Zealand and around the world. Free access is provided to AIQS and NZQIS members.

Notwithstanding the justification for New Zealand and Australia as a unified region, the quantitative data gathered in this study is stratified and analysed at the national level to enable sub-strata analysis, comparisons and conclusions to be made. The impacts of responses from the two countries on the research are discussed in the respective sections of the Thesis. The geo-political focus of the research project is noted as a delimitation in section 1.8. The Response rates for both strata of the population are presented in sections 5.2.2 and 5.3.2. The impact of cultural views on the responses given is discussed in section 8.2.5.

1.3 Research Problem

1.3.1 Problem Statement

The following problem statement sets out the deficiencies and uncertainties in current areas of knowledge and practice and articulates the solution this research intends to provide.

As in any industry, strategic planning is essential for QS firms to enable them to form strategies to survive and compete (Mintzberg, 2000; Mintzberg, Ahlstrand, & Lampel, 1998). Unfortunately, strategic planning in QS firms tends to be underdeveloped and ad-hoc, and when it is done, there is a lack of relevant comprehensive frameworks that could be used to guide decision makers (Betts & Ofori, 1992, 1994; Murphy, 2012, 2016). This research seeks to address this by providing a tested model that identifies the key factors to be considered by QS firms in strategic planning and quantifies the influence each factor has on overall success.

1.3.2 Current Status of Research Problem in New Zealand

The current status of the research problem in New Zealand is difficult to ascertain due to the lack of local research undertaken in the field despite a significant and pressing research agenda (O'Brien et al., 2014) and both the NZIQS and AIQS setting in place strategic objectives to raise the credibility, relevance and influence of the profession (AIQS, 2019; McKay, 2019).

Historical studies provide insights into the Strategic Planning practices of QS firms (Boon, 1996, 2001, 2008), the specific challenges faced (such as the changes, threats and opportunities identified by (Frei & Mbachu, 2009)), and suggested frameworks for situation analysis (Frei, Phipps, & Mbachu, 2013). Other than studies looking at very specific topic areas (such as the work on Building Information

Modelling uptake among QS firms by Harrison and Thurnell (2015), these studies have not been followed up in recent years to provide an insight into the current status.

Internationally however, studies into strategic planning in QS firms (Murphy, 2016) as well as frameworks for situation analysis (Ramdave & Harinarain, 2020) continue to be made. There is no evidence to suggest that the situation in New Zealand is more advanced or mature – or the need any less pressing. In fact, this lack of local literature, coupled with the motivational statements of the NZIQS (McKay, 2019) and AIQS (2019) underscores the very importance of this study, to not only provide an answer to the research problem, but by doing so, to provide a snapshot of current status.

1.4 Research Questions

The following research questions are original and posed in such a way to inform the articulation of the subsequent aims and objectives. This study sets out to answer the following questions:

1. What are the key Factors that should be considered in strategic planning for QS firms?
2. How should QS firms prioritise improvement effort between the key Factors under their control (Internal Factors)?
3. How does performance of each of the key Internal Factors contribute to successful business outcomes?

1.5 Aims

The research aims are expressed to answer the research questions. The aims of this study are:

1. To identify what the key Internal and External Factors are for QS firms to consider during strategic planning for successful outcomes.
2. To quantify the relative importance of the Internal Factors; the relative impact of the External Factors, and; the degree of matching between combinations of Internal and External Factors.
3. To develop a quantitative model to guide the prioritizing of the performance effort to be directed toward individual Internal Factors through quantitative matching with External Factors.
4. To test whether the performance improvements identified by the developed models correlate with more successful business outcomes.

1.6 Objectives

Objectives should be single-sentence statements that break down each of the aims into focused actions (Naoum, 2013). The set objectives are grouped under headings relating to the aim they support:

1. Objectives supporting Aim No. 1:
 - a. To identify the key Internal Factors that should be considered in QS firms' strategic planning process.
 - b. To identify the key External Factors that should be considered in QS firms' strategic planning process.
 - c. To establish how QS firms measure success.
2. Objectives supporting Aim No. 2:

- a. To quantify the perceived impact of the established External Factors in the operating environment.
 - b. To quantify the importance placed on the Internal Factors in view of the state the External Factors at the same time.
 - c. To establish whether perceptions of Internal Factor importance and External Factor impact change over time.
 - d. To establish whether perceptions of Internal factor importance and External Factor impact are culturally specific.
 - e. To establish whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders.
 - f. To establish whether perceptions of Internal factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with carrying it out.
 - g. To quantify the extent to which Internal Factors can be matched with External Factors (External Factor / Internal Factor relationship) resulting in strengths leveraged, opportunities missed, weaknesses undermined, and threats mitigated.
 - h. To establish whether the strength of External Factor / Internal Factor relationships change over time.
3. Objectives supporting Aim No. 3:
- a. To develop a quantitative model based on the 'perceived importance-based' weightings of controllable Internal Factors to predict success and allow firms to identify which Internal Attributes to prioritise for performance effort.

- b. To develop a second quantitative model based on the ‘External Force-matched’ weightings of controllable Internal Factors to predict success and allow firms to identify which Internal Attributes to prioritise for performance effort.
 - c. To establish whether the ranking in Internal Factors in the ‘perceived importance-based’ model matches the ranking in the ‘External Force-matched’ model.
 - d. To establish whether QS firms’ relative levels of performance of Internal Factors matches the order of importance of those Factors based on the ‘perceived importance-based’ model.
 - e. To establish whether QS firms’ relative levels of performance of Internal Factors matches the order of importance of those Factors based on the ‘External Force-matched’ model.
4. Objectives supporting Aim No. 4:
- a. To measure the relative levels of success and performance – in terms of the developed models – of real-life QS firms.
 - b. To establish whether there is a positive correlation between their relative levels of modelled health and success.
 - c. To establish which of the two models provides the more accurate prediction of success.

Objectives 1(a) to (c) are addressed in the Exploratory Research Results chapter. Objectives 2(a) to (h) are addressed in the Descriptive Research Results chapter. Objectives 3(a) to (e) are addressed in the Developed Research Models chapter. Objectives 4(a) to (c) are addressed in the Model Validation and Testing chapter.

The table below differentiates between the objectives that are required in order to accomplish the main research aim (i.e. the development and testing of a quantitative situation analysis model) and those that are included to provide additional insight and context.

Table 1: Supporting objectives versus objectives required in order to accomplish main aim

| Objectives required in order to accomplish main aim | Objectives provided for contextual support to main aim |
|---|--|
| 1a: Internal Factor identification 1b: External Factor identification 1c: Establish success measures 2a: External Factor impact 2b: Internal Factor importance 3a: To develop a quantitative model based on the 'perceived importance-based' weightings 3b: To develop a second quantitative model based on the 'External Force-matched' weightings 3c: To establish whether the rankings in Internal Factors is the same for both models 3d: To establish whether QS firms' relative levels of performance matches the order of importance of the 'perceived importance-based' model 3e: To establish whether QS firms' relative levels of performance matches the order of importance of the 'External Force-matched' model 4a: To measure the relative levels of success and performance – in terms of the developed models – of real-life QS firms. 4b: To establish whether there is a positive correlation between their relative levels of modelled health and success. 4c: To establish which of the two models provides the more accurate prediction of success. | 2c: Time effect on perceptions of Internal Factor importance and External Factor impact 2d: Cultural effect on perceptions of Internal Factor importance and External Factor impact 2e: Stakeholder effect on perceptions of Internal Factor importance and External Factor impact 2f: Strategic decision making responsibility effect on perceptions of Internal Factor importance and External Factor impact 2g: To quantify the extent to which Internal Factors can be matched with External Factors 2h: Time effect on strength of External Factor / Internal Factor relationships |

1.7 Limitations

There were a number of limitations were encountered in the study; each are noted below together with the main mitigating techniques applied.

The main limitation encountered in this study is the low response rate to the web questionnaire. This limits the extent the results should be generalized outside of the study population and also limited the

amount of analysis that could be undertaken within any sub-strata of the data (Saunders, Lewis, & Thornhill, 2016). Low response rates are a known challenge in construction research and specifically in the ANZ QS field (as advised by the NZIQS). The low readership of professional institute e-bulletins (measured by click-through rate), further limited the effective distribution of the questionnaire. Additionally, the need to compete for attention amongst a large number of undergraduate and industry research questionnaires provided a further challenge. Pre-testing of the questionnaire, use of intuitive proprietary web-based survey tools, distribution through reputable industry professional institutes, and the offering of incentives were among the techniques used to maximise response rates. This is further compounded by the requirement for relatively higher response rates for small populations as evidenced by the guidance provided by Saunders et al. (2016) in the table below.

Table 2: Sample sizes based on population size at a 59% confidence level and a 5% margin of error (Saunders et al., 2016)

| Population (N) | Sample (n) | Sample (%) |
|----------------|------------|------------|
| 2,000 | 322 | 16.1% |
| 5,000 | 357 | 7.14% |
| 10,000 | 370 | 3.7% |
| 100,000 | 383 | 0.4% |
| 1,000,000 | 384 | 0.03% |
| 10,000,000 | 384 | 0.003% |

A second limitation was the inability to access financial data (such as audited accounts) of the case study firms which mean that self-reported sentiment proxies need to be relied upon instead. The assumptions regarding the validity of these proxies is discussed in the Assumption section (section 1.9) below.

1.8 Delimitations

The following delimitations were set as parameters to focus the scope for the study:

- **Geo-political region of interest**

Australia and New Zealand were the primary areas of interest for the study. This informed the selection of primary sampling frames and provided the area of focus for the study.

- **Population of interest**

Primarily QS's only – the views of external stakeholders (clients, associated disciplines) were not expressly sought.

- **Sampling frames**

Membership lists of the Australian and New Zealand Institute of Quantity Surveyors (AQIS and NZIQS) provided the sampling frames for QSs in both countries.

- **Internal Factor variables excluded**

Generic operational or non-QS firm specific attributes are not of interest to this study and were not investigated (e.g.: financial administration systems, accounting, payroll, etc.).

- **Design School of Strategy Formation**

Whilst other schools exist, the Design School approach to strategy formation, based on situation analysis (commonly SWOT analysis) of Internal and External Factors was selected as the main theoretical frame for this study.

1.9 Assumptions

There are three main assumptions underpinning this research:

1. that the answers received from survey participants are truthful responses;
2. that self-selection has not caused bias to skew results, and;
3. that the proxies chosen as measures of success are reasonable reflections of actual financial success.

1.9.1 Truthful Responses

The validity of the finding relies heavily on the honesty of survey respondents. It has been found that individuals may be inclined to moderate their responses to data requests in business research for a variety of reasons (Malheiros, Preibusch, & Sasse, 2013) but simple steps in can be taken in survey design to maximise the truthfulness of responses (Saunders et al., 2016)

The following factors support the assumption that responses, were on the whole, truthfully made: questionnaire participation was optional and respondents were allowed to discontinue at any time; questionnaire responses anonymous and respondents were advised that this was the case; there were no personal questions or questions about individuals' conduct or behaviour, and; questions were not of a sensitive nature.

For the case studies, questionnaires were administered to the entire organisation, to reduce the impact of any respondents with an ownership stake, that might feel motivated to represent their firm in the best possible light and therefore skew results.

1.9.2 Self-selection Bias

Due to the anticipated low rates of response (see section 1.7 above) a census sampling approach was applied to the descriptive questionnaire stage. The presence of non-responses means positive responses are essentially self-selected. However, as noted by Keating (1989), Fricker (2008), and Sharma (2017), self-selection in sampling should not immediately cause concerns of bias or undermine confidence in results of what is otherwise well designed research. It could be argued that self-selection dictates that only respondents that have an interest in providing considered answers take part. Noting also that the subject matter of the study is not of a sensitive nature, and does not require respondents to make judgements of, or comparisons to other professions, the likelihood of individual respondents having particularly biased views is reduced.

1.9.3 Proxies for Measuring Success

As it was not possible to access financial accounts for the case study firms to derive quantitative financial metrics of business performance, self-reported sentiment proxies were relied upon in their place. The validity of these proxies is supported by the literature review undertaken as well as the results of the in-depth semi-structured questionnaires which together informed the definition of the proxies. Reliance on soft or qualitative measures of business performance is an approach supported in the literature (Dawes, 1999; Santos & Brito, 2012; Selvam, Gayathri, Vasanth, Lingaraja, & Marxiaoli, 2016; Sigo, 2020) which holds that soft measures are a valid approach and identify a strong correlation with traditional financial metrics.

1.10 Researcher's Perspective

It is important to identify the researcher's perspective to understand any inherent interests the researcher might promote (R. Clarke & Davison, 2020) – whether intended or not.

The researcher is currently an Associate Director of Quantity Surveying within a global, multi-disciplinary, publicly listed built-environment consultancy firm. Previous roles including cost and contract management functions for main contractor and vertically integrated property development companies. This experience positions the researcher as an informed 'insider' to the subject area rather than an unapprised external observer. As a practitioner, and stakeholder of the QS profession, the researcher has a professional as well as academic interest in the findings generated by this study.

1.11 Importance of the study

There is a dearth of local research into the challenges facing QS's as well as the solutions available to them (O'Brien et al., 2014). By prompting practitioners to reflect on their current practices, future directions and desired future states, feedback could be obtained, not only on the perceived opportunities and threats, but also on the QS firms' abilities to maximise the opportunities, minimise the imminent threats, and avoid the undermining of weakness and missed opportunities; as well as to gain understanding of the most urgent areas requiring reengineering and improvement.

To assist QSs with implementing the changes required, this overall research project's intended contribution is the development of a rigorous quantitative analytical method for diagnosing the strategic health of a quantity surveying services firm based on SWOT analysis results. QS's, by definition, are familiar with quantitative thinking and approaches – so it follows that a quantitative approach to strategic planning would be well received by practitioners. The outcomes of the proposed

developed method would not only enable the diagnosis and quantitative modelling of an organisation's relative level of strategic health but also identification of the key areas needing treatment in order to increase strategic health to the required level. This addresses the observation made that strategic planning in QS firms tend to be ad-hoc – or worse – neglected entirely (Murphy, 2012), by providing a guiding framework.

Whilst the empirically determined research outcomes will be based on the data for the Australasian QS firms, the main constructs will be of benefit to construction cost managers in a range of other settings. Furthermore, the developed theoretical model and methodology for assessing organisational strategic health and critical success factors (CSFs) would be applicable to the management of organisations beyond the QS context.

1.12 Summary of Subsequent Chapters

1.12.1 Chapter 2: Literature Review and Theoretical Framework Development

This chapter presents a review of the extent literature regarding strategic planning with a particular focus on the Design School approach including the popular SWOT analysis tool. Existing concepts of organisational health are explored, and the main works are summarised. Research regarding approaches to strategic planning in QS firms, and the main themes regarding Internal and External Factors affecting QS firms is reviewed and summarised.

The main gaps identified in the literature are firstly, the lack of an empirically determined, comprehensive and specific Situation Analysis framework of Internal and External Factors relevant to QS firms when undertaking a situation analysis and secondly, the lack of applicable quantitative situation analysis models that could be used by QS firms for strategic planning.

The chapter concludes by summarising the theoretical frameworks that provide the context for the study. A conceptual model centred on the Design School approach to strategy formulation and borrowing from the concept of systemic Organisational Health is proposed for the development of a quantitative Strategic Health model. The definition of Strategic Health as applicable to this study is proposed.

1.12.2 Chapter 3: Research Methods

This chapter presents the methods applied, and the main steps taken in data gathering and analysis. The three main stages of the study are outlined. The exploratory stage is concerned with uncovering the key Factors influencing QS firm success and applies qualitative methods of semi-structured in-depth interviewing. The next stage following the interviews, is the descriptive stage, which is comprised of two stages of survey research aimed at quantitative description of the Factors uncovered in the exploratory stage. The final stage is evaluative; testing the research models – developed using the descriptive data – in case study settings.

The main programmes and applications employed in the gathering (Survey Monkey, Qualtrics), storing (Dropbox) and analysis (IBM SPSS) of the data are noted and explained. 12 hypotheses are formulated to address the research objectives and the tests for each hypothesis are proposed.

The main statistical techniques employed include the Kolmogorov–Smirnov and the Shapiro-Wilks tests for checking the central tendency of the data; Cronbach’s alpha for measuring the degree of internal consistency across measures; Spearman’s Rank Correlation Coefficient for the testing of relationships between variables, and Mann Whitney’s U for comparing the mean ranks of groups.

1.12.3 Chapter 4: Exploratory Research Results

This chapter documents the results of the in-depth interviews with key industry leaders and presents the framework of key factors and success measures that were identified.

The 26 key Internal Factors distilled were:

- Leadership, Market awareness, Strategic management, Firm flexibility, People management
- Interpersonal skill, Communication skill, Rigour, Teamwork, Ethical conduct
- Relationship management, Client quality, Networks, Brand, International reach
- Knowledge management, Work methods, IT systems, Training, Innovation capture
- Measurement ability, Estimating ability, Cost control ability, Cost knowledge, Construction knowledge, Legal knowledge

The 28 key External Factors uncovered were:

- Associated professions, Non-construction professions, Non-building, Other industries, Environmental services, Barriers to entry
- IT substitutions, Non-traditional procurement, Lead consultants, In-house QS, Public cost data,
- Qualifications, Employment market, IT advances, Upstream information
- Industry cycles, Private sector, Public sector, Associated professionals, Contractor demand, Supply chain position, International demand
- Institute CPD, Institute profile, Professional collaboration, Price competition, Large firms, Profession lifecycle

The main measures of success indicated were indicated to be sustained financial profit and growth. Stakeholder satisfaction was identified as a secondary measure.

1.12.4 Chapter 5: Descriptive Research Results

This chapter presents the results of the descriptive research phase which consisted of the gathering of quantitative data through questionnaire surveys. The primary research aim that this chapter sets out to address is to quantify the relative importance of the Internal Factors; the relative impact of the External Factors, and; the degree of matching between combinations of Internal and External Factors.

Data was gathered in two rounds of observation. The original observation was carried out in 2013, with a follow-up observation undertaken in 2020. The results of the both rounds of observation are presented.

The chapter resolves several research objectives. The perceived impact of the External Factors and the importance placed on the Internal Factors are quantified. It is established that perceptions of Internal Factor importance and External Factor impact do change over time; are culturally specific, and; do vary between internal and external stakeholders as well between those responsible for creating strategy and those responsible for carrying it out. The extents to which Internal Factors can be matched with External Factors (External Factor / Internal Factor relationship) resulting in strengths leveraged, opportunities missed, weaknesses undermined, and threats mitigated were quantified, and it was found that statistically significant relationships do exist. Finally, it was established that the strength of External Factor / Internal Factor relationships do in fact change over time. The results presented in this chapter allow the testing of Hypotheses 1 to 6.

1.12.5 Chapter 6: Developed Research Models

This study aims to develop a model that enables QS firms to assess their strategic health and identify areas for improvement. The definition of Strategic Health adopted for this study is an organisation's level of ability to successfully execute its strategic objectives.

This chapter presents two models – one subscribes to the resource-based view of strategic planning (Model 1), and the other is centred in the Design School approach (Model 2). Both models were populated with data gathered in the quantitative descriptive survey stage.

A key difference between the two models is how Internal Factors are valued. The Model 2 methodology provides a far greater spread of values assigned to each Factor – which is posited would make the prioritising of areas of investment clearer: the most valuable Internal Factor in Model 2 was 'worth' 18.37 times the amount of the least valuable Factor, whereas in Model 1, this multiplier was only 1.57. Both models signal improvement areas by calculating the gap between the 'value' and 'health' score of each Internal Factor – and providing a ranked priority order. However due to the underlying method of calculating Internal Factor value – the two models point to different Factors for prioritising. Model 2 was simulated to provide approximately 2.5 times the level of improvement experienced in Model 1 for the same increase in performance. Hypotheses 7 to 9 are tested with the result presented in this chapter.

1.12.6 Chapter 7: Evaluative Research Results

The purpose of this chapter is to present the explanatory research results of the testing of the Strategic Health model in five case studies of QS consulting firms. The computation of Strategic Health score and ratings of the 10 success indicators for each case (from the results of the questionnaire

administered to staff of each firm) are presented together with the rank correlation analysis results between Strategic Health and each of the success indicators.

Testing of the success measures using Cronbach's alpha determined that the selected success measures have 'good' to 'excellent' internal consistency. The Hypothesis tests found that correlations do exist between five of the 10 success measures and both Model 1 and Model 2. Closer inspection revealed that those five correlations are achieved in Model 2 by consideration of the top ten variables, whereas in Model 1, the same level of correlation is only achieved after the introduction of the 11th variable into the model. Model 2 was therefore said to have the stronger relationship to the tested success measures than Model 1. The alternative hypotheses for Hypotheses 10 to 12 were supported.

1.12.7 Chapter 8: Discussion and Conclusion

This chapter discusses the research results presented in the exploratory, descriptive and explanatory research results chapters. The developed models are reviewed in light of the extant literature and the identified gaps in knowledge and theory. The implications of the research for theory and practice are outlined and suggestions for further research are made. The limitations of the research including its generalisability outside of the population samples in this study are indicated.

1.13 Chapter Summary

The purpose of this Introduction chapter is to provide the background and justification for the study, followed by a presentation of the research goals, limitations and delimitations and an explanation of the study's importance. The critical position of QS's as the construction industry's cost controllers we established. The changing and dynamic nature of the business environment and the requirement for

QS firms to be able to formulate strategies to adapt to, survive and succeed in their operating environment was outlined. It was argued that the ad-hoc nature of strategic planning in QS firms presents a challenge, particularly when coupled with the gap in knowledge regarding existing frameworks for QS firms to rely to guide strategic planning.

The presented research goals – in the form of aims and objectives – are framed to answer the following key prompted by the research problem:

1. What is the approach to strategic planning best suited to QS firms?
2. What are the key Factors that should be considered in strategic planning for QS firms?
3. How should QS firms prioritise improvement effort between the key Factors under their control (Internal Factors)?
4. How does performance of each of the key Internal Factors contribute to successful business outcomes?

The main limitations for the study are low response rates in construction and particularly among QSs; the amount of stratification of the results possible (due to the limitation on response rate), and; the inability to access financial data pertaining to the case study firms. Mitigating factors for the limitations are described.

Delimitations are set around the geo-political region of interest (Australia and New Zealand); the population of interest (QS's); the chosen sampling frames (AIQS and NZIQS) members), and; the excluded variables (Internal Factors generic to all businesses).

The key assumptions made are that the answers received from survey participants are truthful responses; that self-selection has not caused bias to skew results, and; that the proxies chosen as

measures of success are reasonable reflections of actual financial success. Justifications supporting the assumptions are given.

The importance of the study is underpinned by the research outputs; both the further development of existing theory as well as the development of a practical model that could be used by strategic decision makers in QS firms.

Finally, a short summary of each subsequent chapter provides readers with a framework of the thesis to aid navigation through the document.

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Chapter Introduction

The purpose of this chapter is twofold. Firstly, to review and synthesise the existing literature relevant to the research questions and identification of the gaps in extant knowledge that this study seeks to address (Lempriere, 2019b; Sylvester, Tate, & Johnstone, 2013), and secondly; to outline the theoretical context and framework within which this research is positioned and the specific areas of knowledge and theory that this research will contribute to (Farrell, Sherratt, & Richardson, 2016; Hart, 1998; Lempriere, 2019a; Levy & Ellis, 2006; Naoum, 2013).

A first step in this study is to review approaches to strategic planning and decision making in QS firms and relate this to the existing schools of strategic planning in the literature. This chapter will focus on discussing and contextualizing the existing relevant theories, concepts and tools for QS firms to undertake a situation analysis. As such this chapter will:

- Provide an overview of strategy in the literature, including a review of the main theories regarding the nested concept of strategic management and strategic planning.
- Review the literature on the Design School approach to strategic planning including the primary tool for Situation Analysis (SWOT analysis) as a key step in strategy formation.
- Review the literature on strategic management and strategic planning approaches in QS firms and discussed the appropriateness of the design school approach.

- Review existing theories regarding organisational health, including identification of which view of organisational health best fits with this study, and A critique of organisational health fairy when compared to the design school approach to strategic planning.
- Review of the key measures of success in for-profit organisations.
- Review of key Situation Analysis (SWOT analysis) Factors relevant to QS firms
- Identify any gaps between the strategic planning theory and the developed tools and frameworks that are actually available to QS firms to facilitate strategic planning processes.

Following a discussion of these main concepts and their relevance to this study, a developed theoretical framework is presented outlining how the existing theories will be operationalized to inform the research strategy and the development of a testable model.

2.2 Strategic Planning

This section of the literature review provides an overview of strategy as it relates to organisations, before reviewing the main theories of strategic management and strategic planning.

2.2.1 Strategy

The Cambridge Dictionary describes strategy as: “*a detailed plan for achieving success in situations such as war, politics, business, industry, or sport, or the skill of planning for such situations* (Strategy, 2020).” Early literature on the subject comes from the field of military theory; Sun Tzu’s ‘Art of War’ and Prussian general Carl von Clausewitz’s ‘On War’ are two notable examples. Clausewitz (Howard & Paret, 1976), who was writing after the Napoleonic wars describes strategy as:

“...the use of the engagement for the purpose of the war. The strategist must therefore define an aim for the entire operational side of the war that will be in accordance with its purpose. In other words, he will draft the plan of the war, and the aim will determine the series of actions intended to achieve it: he will, in fact, shape the individual campaigns and, within these, decide on the individual engagements (p.177).”

While there may be no single universally accepted definition of strategy in the context of organisations (Feldman, 2020; Quinn, 1980; Saxena, 2006; Steiner, 1997), there is a significant body of knowledge that has been generated since around the middle of the last century that gives a rich and multi-dimensional view of what strategy involves. Early on in the first half of the 20th century, strategy was thought of (Von Neumann & Morgenstern, 1944) as a sequence of independent decisions aimed towards a common goal: *“a complete plan [...] which specifies what choices [the player] will make in every possible situation (p.79).”* Observations of organisations such as Standard Oil, Du Pont and General Motors changing their organisation structures in response to changing market demands led Chandler (1990) to define strategy as: *“the determination of the long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out those goals (p.13)”*

Chandler argued that once an organisation had established its strategy, it could then identify and assume an organisational structure that best aligned with the chosen strategic action. This view however, was not without numerous critics (Ebbutt, Rennison, Russell, & Roseby, 2009; Tennent, 2020). Pascale (1990) summarised the counterview (upheld by Ajagbe, Bih, Olujobi, and Udo Udo (2016) and Li, Lu, Ryan, and Sun (2021)), pointing out that quite frequently, it was indeed an organisation’s structure that influenced their strategic actions, rather than the other way around – even when faced with the deteriorating likelihood of success for doing so.

A common definition of strategy adopted by contemporary business scholars (Khalifa, Alsaïd, & George, 2016; Liedtke, 2019; Narikae & Lewa, 2017; Peters & Simaens, 2020) is this, provided Andrews (1971):

“Corporate strategy is the pattern of decisions in a company that determines and reveals its objectives, purposes, or goals, produces the principal policies and plans for achieving those goals, and defines the range of business the company is to pursue, the kind of economic and human organisation it is or intends to be, and the nature of the economic and non-economic contribution it intends to make to its shareholders, employees, customers, and communities (p.18).”

2.2.2 Strategic Management

Strategic management is typically considered a cyclical process, encompassing strategic planning, that begins with determining the organisation’s vision and mission, taking stock of the current state, before developing, implementing and reviewing strategic actions (Chambers & Taylor, 2018; Ebener & Smith, 2015; Gurel & Tat, 2017; Katsioloudes & Abouhanian, 2017; Nickols, 2016); Porth (2003) .

Porth (2003) defines strategic management as:

“...a process of formulating, implementing, and evaluating cross-functional decisions that enable the organisation to define and achieve its mission, and ultimately to create value” (p. 2).

The overriding purpose of strategic management is to create value for the organisation’s stakeholders. Typically, the strategic management process is broken down into five distinct but interrelated steps (Feldman, 2020; Gillespie, 2019; Nickols, 2016; Porth, 2003):

1. develop the organisation’s mission and values;

2. perform a situation analysis through audit of internal strengths and weakness and external scan of the operating environment;
3. set objectives and craft strategy including setting the direction for how the organisation will achieve its mission;
4. implement the chosen strategy efficiently and effectively; and
5. assess value creation and provide feedback to determine whether or not success has been achieved, and if required, provide feedback to enable corrective action.

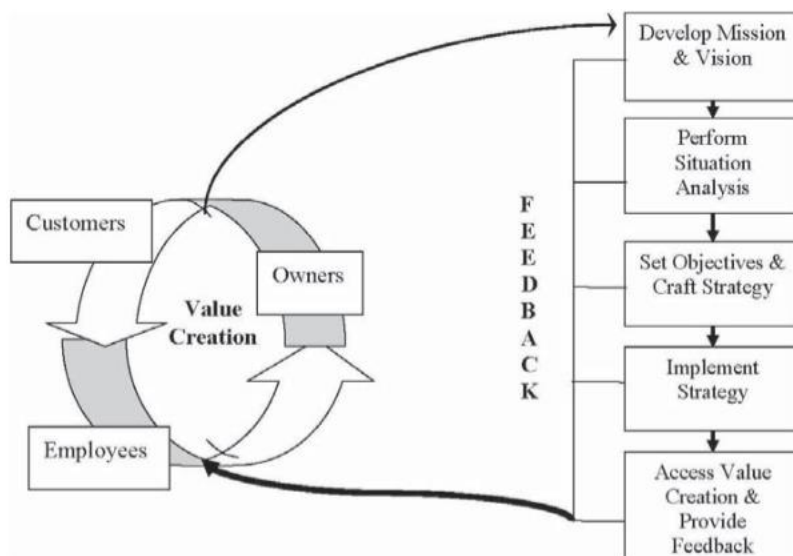


Figure 1: The Strategic Management Framework from Porth (2003)

2.2.3 Strategic Planning

Strategic planning, are the activities involved with the formation of strategies to achieve an organisation's mission and vision. (Feldman, 2020; Mintzberg et al., 1998; Porth, 2003). The proliferation of strategic formation theory throughout the latter half of the 20th century prompted Mintzberg et al. (1998) to publish the seminal "Strategy Safari" text. In it, the authors summarise the

key strategy theories and categorise these in a framework of ten schools of strategy formation (Brønn & Brønn, 2018; CIO-Wiki, 2021; Mintzberg et al., 1998; Mintzberg & Lampel, 1999; Schäfer, Projer, & Wortmann, 2021). This framework is helpful for understanding the philosophies underpinning the various tools and approaches applied to strategic planning (including those adopted for this study).

1. The **Design School** considers strategy formation as a process of conception. The Design School approach is typified by the popular SWOT analysis tool. The matching – essential fit – of the organisation’s internal situation with the external environment is central to this approach. Critiques of the Design School include a risk of oversimplification of reality, inflexibility in dynamic environments, and a tendency to sidestep learning (Brønn & Brønn, 2018; Learned et al., 1965; Schäfer et al., 2021; Selznick, 1957).
2. In the **Planning School** strategy formation is a formal process, this view originated at a similar time to the Design School, but the steps taken from analysis to execution favour a more rigorous and prescriptive approach. Critiques of the Planning School include a tendency towards a checklist-style approach and the forming of ‘planning’ functions which can have the effect of removing senior management – those actually responsible for the organisation’s performance – from the strategic planning process (Ansoff, 1968; Brønn & Brønn, 2018; Schäfer et al., 2021).
3. The **Positioning School** considers strategy formation as an analytical process. Porter describes a fairly prescriptive approach to selecting generic strategic options to improve an organisation’s strategic position within an industry. The positioning school is therefore criticised for its ‘academic’ approach and is mainly seen as suited to large corporations (Brønn & Brønn, 2018; Michael E Porter, 1985; Schäfer et al., 2021).

4. In the **Entrepreneurial School** strategy formation is seen as a visionary process. The approach described is an intuitive process and creative process undertaken in the mind of the organisation's leader or founder. Criticisms of the Entrepreneurial School mainly centre around the lack of defined approach, and the risks of strategic decision-making resting in the mind of a single entrepreneurial leader (Brønn & Brønn, 2018; A. H. Cole, 1959; Schäfer et al., 2021; Schumpeter, 1934).
5. The **Cognitive School** considers strategy formation as a mental process and is concerned with the cognitive processes applied to strategy. The lack of practical applications is the school's main criticism (Brønn & Brønn, 2018; March & Simon, 1958; Schäfer et al., 2021; Simon, 1974).
6. An emergent process of strategy formation is the view taken in the **Learning School**. The approach is taken is to allow strategy to emerge in small incremental steps. The Learning School is criticised for running counter to the dominant schools of strategy formation; strategists exist almost arbitrarily throughout the organisation and there is a risk of failing to define clear long-term strategies (Brønn & Brønn, 2018; G. Hamel & Parahalad, 1994; Quinn, 1980; Schäfer et al., 2021).
7. The **Power School** considers strategy formation as a negotiation process. Originally drawing on observations of decisions made during the Cuban missile crisis, this school takes a political lens to the approaches taken to strategy, and as a result it risks overstating the importance of power in strategic planning (Allison, 1971; Brønn & Brønn, 2018; Schäfer et al., 2021).
8. In the **Cultural School** strategy formation is seen as a collective process and espouses a collective approach that results in strategy formed after reflection on the organisation's beliefs, value and culture. It is criticised for being vague and prone to misuse to justify the current

state of the organisation and avoid change (Brønn & Brønn, 2018; Normann, 1977; Rhenman, 1973; Schäfer et al., 2021).

9. A reactive process is the view of strategy formation taken in the **Environmental School**. The approaches taken are essentially a response to the external environment. It is criticised for being of limited use for strategic decision making as it is more concerned with highlighting the demands emerging in the operating environment (Brønn & Brønn, 2018; Hannan & Freeman, 1977; Pugh et al., 1968; Schäfer et al., 2021).
10. Lastly, the **Configuration School** sees strategy formation as process of transformation. The approaches taken see the organisation completely transforming its decision-making structures. A sort of ‘meta’ approach, the configuration school takes the most relevant aspects of the preceding schools. Its chief criticism is a tendency to constrain strategy to a limited number of configurations (Brønn & Brønn, 2018; Alfred D. Chandler, 1962; R. E. Miles & Snow, 1978; Miller & Friesen, 1984; Mintzberg, 1979; Schäfer et al., 2021).

2.3 Strategic Planning in Quantity Surveying Firms

Porter’s theories of competitive strategy are found to have been applied to the construction industry (Betts & Ofori, 1992, 1994; Cannon & Hillebrandt, 1989, 1990; Flanagan, Lu, Shen, & Jewell, 2007). Unfortunately, despite strategic planning being vital for the survival and success of all organisations, it seems to be mainly confined to main contractors (Betts & Ofori, 1994). Even amongst main contractors, it appears that much of the planning emphasis in construction is directed at projects rather than strategic planning at the organisational level (Phua, 2006).

Unfortunately, several authors have noted that although strategic planning practice has become well established in business, including in the construction industry, these concepts have rarely been adopted by construction professional services firms (Jennings & Betts, 1996; Murphy, 2012). This may be due to strategic analysis of construction professional services firms being less straightforward than for main contractors which may have created a barrier to uptake (Jennings & Betts, 1996). A further constraint may be that research in strategic planning in other industries and organisation types is not directly applicable to professional services firms in construction such as QS practices (Hasnanywati Hassan et al., 2008).

It is not surprising therefore, that extant literature on strategic planning in QS firms is scant.

A longitudinal observational study (Boon, 1996, 2001, 2008) undertaken in four QS practices in Auckland, New Zealand in 1995, 2001 and 2008 reported on the management of those practices including their strategic positioning. The study assessed the strategic positioning of the firms using Porter's (1985) two positions of 'cost leadership' and 'differentiation'. Boon observed that the firms' decisions to compete on price or value appeared to change in relation to the prevailing economic climate. He also noted that some of firms found themselves somewhere between the low cost and value-added positions. Porter (1985) considered this 'stuck in the middle' position to be a highly unsustainable option. While Boon's study did not specifically report on how strategic decisions were made, nor the approach taken or tools that were used, in strategic planning, the author did make the observation that the positioning of two of the firms appeared to be the result of what Mintzberg and Waters (1985) describe as 'emergent' rather than 'deliberate' strategy.

A study undertaken in Ireland (Murphy, 2012, 2016), investigated the prevalence of strategic planning in QS firms and the factors that influence the type and extent of the approaches taken. The study consisted of semi-structured interviews with the directors of ten QS firms, followed up by

questionnaires sent to 150 members of the QS division of the Society of Chartered Surveyors Ireland, achieving a 41% response rate. The author found that the approximately two thirds of firms did not subscribe to a formal document strategic planning process. Any strategic planning that was undertaken, tended to be unstructured and undocumented and driven by a top-down approach with limited employee participation. Murphy noted however, that the construction sector downturn and the overall economic conditions at the time, appeared to be behind an emerging increase in the prevalence of systematic approaches.

Practice size and ownership structure were found to be two key determinants of the type of processes undertaken. The third of firms that did have formal strategic planning processes, tended to be larger firms, often part of a large multinational consultancy group. In these instances, strategic planning processes tended to be driven by 'head office' requirements and often involved the use of strategic planning tools and frameworks.

The lack of strategic planning amongst smaller and medium sized firms is a widely observed problem not limited to QS firms (French, Kelly, & Harrison, 2004; Majama & Magang, 2017; Calvin Wang, Walker, & Redmond, 2007).

Regardless of whether the process was formal or informal, Murphy found that strategic planning in QS firms tends to be led by top level decisions makers. Objectives and strategies were formed as a result of a scan of internal environments and competencies and external environments. Internal factors included staff, marketing, finance and IT, while external factors included macroeconomics, the industry, and professional body standards.

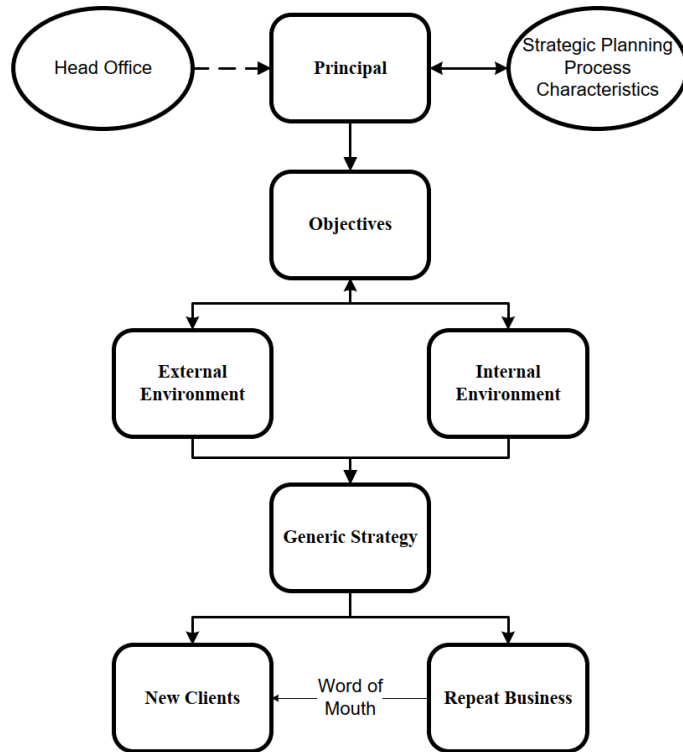


Figure 2: QS Practice Strategic Planning Process Model from Murphy (2012)

A notable exclusion to the strategic planning processes observed, was any form of competitor analysis. Firms stressed the importance of repeat business from existing clients as underpinning their strategic intentions which was posited to lead to a focus on internal capability and competency rather than on competitors.

Further follow up studies undertaken by Murphy (2016) gave a longitudinal view of changing approach to strategic management and found that decision making had become less tactical and more strategic in response to a rapidly changing and complex business environment.

Jennings and Betts (1996) carried out a study involving the analysis of 47 questionnaire responses from senior partners at randomly selected PQS firms throughout the UK. Similarly to Boon's (2001) study, Jennings and Betts examined Porter's (1985) generic strategies in regard to QS practices. They

found that 'differentiation' was the most popular strategy with 60% of respondents ranking it first, followed by 'focus' at 32% and lastly 'cost leadership' at 8%. In this study, differentiation was defined as improving the quality of the service offered. To 'provide accurate advice/info' was the most popular objective for differentiation, followed by 'clearly identify client's needs' and 'provide a personal service'. The focus strategy was described as occurring where firms concentrate on a specific market niche. Essential to this strategy was to 'develop expertise in area' was identified as the primary strategic option for a focus strategy, followed by 'market to specific client type' and 'employ specialist staff'. Finally, the cost leadership strategy essentially amounted to reducing fees. 'Increase surveying task efficiency' and 'optimise staff/salary levels' were the highest ranked objectives for focus strategies, followed by 'discard unnecessary overheads'.

The authors observed that the strong preference for differentiation as a generic strategy highlighted the high degree of differentiation-based competition present within the profession. Focus also had some value to strategy formulation whereas cost leadership had very little. They posited that while Porter's generic strategy could be applied to QS firms for strategy formulation, the lack of cost leadership as a chosen strategy indicated that Porter's model did not provide a balanced definition of strategy for QS firms. The authors pointed to Maister (1986) and Doorley, Gregg, and Gagnon (1988) who all pointed to people, technology and processes as key strategic resources. Reflecting on the findings of their study and the work of Michael E Porter (1985), Maister (1986) and Doorley et al. (1988), prompted the authors to propose a new framework to categorise the specific strategies employed by QS firms depending on level of service and client base. Jennings and Betts described these generic strategies as execution, expertise, efficiency and experience.

| | | Level of Service | |
|-------------|----------|------------------|-----------------|
| | | Simple | Complex |
| Client Base | Varied | 1 Execution | 2 Expertise |
| | Specific | 3 Efficiency | 4 Experience |

Figure 3: Generic strategies for PQS practice from Jennings and Betts (1996)

The first strategy is ‘execution’ which is suited to a varied client base and a simple level of service. This was observed in small to medium practices pride themselves of providing timely and accurate information and rely on their relationships and quality outputs to ensure repeat business. ‘Expertise’ is the second strategy which lends itself to a varied client base but requires the ability to provide complex services. This was observed in larger practices who had a greater number of highly experienced staff and were therefore able to provide more complex services with a focus on clearly identifying and tailoring their delivery to their client’s needs. As a result, they are able to charge a relatively higher fee. The third strategy is ‘efficiency’ which is a cost-focused strategy targeting specific clients to provide a simple level of service. This strategy lends itself to small to medium sized practices and new entrants to the industry focused on providing services that are adequate, but for a competitive price. Lastly, ‘experience’ is the fourth generic strategy which is differentiation focused by providing complex services to specific clients. These practices tend to be well established and have extensive experience with particularly complex project and service types enabling them to charge a premium.

Unfortunately, the model remained speculative as Jennings and Betts did not undertake quantitative study to test the model’s application. The model does however illustrate that competitive strategies in

QS firms can be categorised through examination of the characteristics of the internal levels of services offered by the firms coupled with the client base in their external business environment. Jennings and Betts underline the importance of these internal and external elements in their summarising statement:

“In order for senior management to use this PQS specific model to strategically plan their future they must have an in depth understanding of the characteristics of their organisation and of the environment with surrounds their business arena (Jennings and Betts, 1996, p. 181).”

H Hassan (2010) examined the influence of Malaysian QS firms’ strategic orientation on strategic planning processes. The author used Miles & Snow’ (1978) typology which classifies organisations as either prospectors, defenders, analysers or reactors. The study found that QS firms subscribed in varying degrees to each of the four typologies. Prospector and Defender type firms were the most active in all stages of strategic management – formulation, implementation, and evaluation and control. The study did not go as far as to identify strategic options for QS firms aligned with each strategic orientation. However, Porter’s (1985) ‘differentiation’ strategy seems to be preferred by most firms regardless of size – as found in a study on the competitive strategies of Malaysian QS firms reviewed in light of Porter’s (1985) generic strategies with the addition of Warszawski’s (1996) ‘growth’ strategy (N. Z. Abidin et al., 2014).

The benefits of strategic planning in QS firms was illustrated in a Malaysian study of 34 QS firms (H. Hassan, Rahmat, & Ali, 2007) which investigated the relationship between three stages of the strategic planning process and firm growth. Firm growth was measured across three self-reported proxies: increase in staff; profit rate, and; diversified clients. Overall, nine activities within the strategic planning phases of formulation, implementation and evaluation were tested. The study found that not one of these activities failed to yield a significant positive correlation with all three measures of both financial and non-financial QS firm growth – indicating the strong value of strategic planning.

2.4 The Design School of Strategic Planning

2.4.1 Key Aspects of the Design School

The first of Mintzberg's ten Schools of Strategy Formation is the Design School. The primary emphasis of the School is the appraisal of internal and external factors as the key step in strategy formation (Mintzberg et al., 1998).

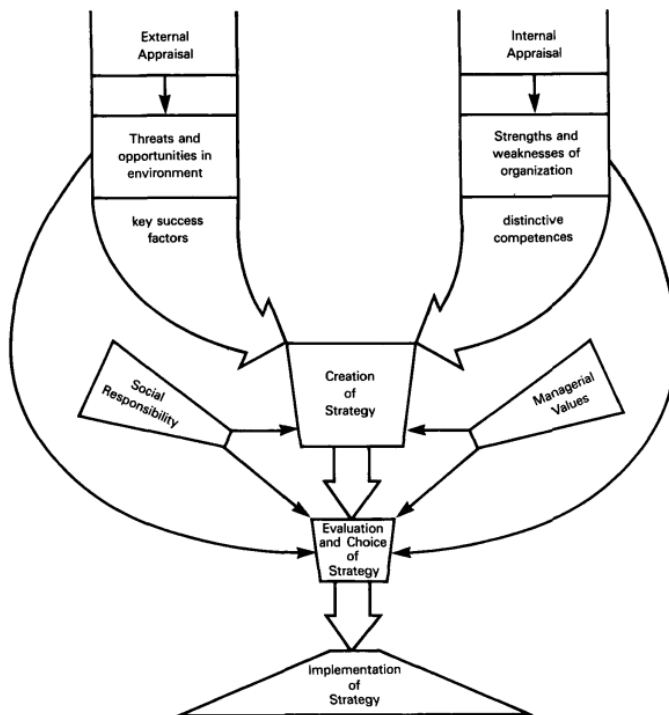


Figure 4: The Mintzberg (1990) Basic Design School Model (p. 174)

A handful of key premises typify the Design School approach (Christensen et al., 1982; McKiernan, 2017):

1. Strategy formation should be a deliberate process of conscious thought – meaning a deliberate process.

2. Responsibility for that control and consciousness must rest with the chief executive or general manager: that person is the strategist – meaning that strategic planning is the responsibility of senior management.
3. The model of strategy formation must be kept simple and informal – meaning it needs to be readily understood and usable by everyday business managers.
4. The design process is complete when strategies appear fully formulated as perspective – meaning strategy formation is a defined process with a start and finish rather than an ongoing iterative process.
5. These strategies should be explicit, so they have to be kept simple – meaning the strategy must be explicit and clear for all.
6. Finally, only after these unique, full-blown, explicit, and simple strategies are fully formulated can they then be implemented – simply implying a step by step process of formation before implementation.

The Design School is selected is selected for the Theoretical Framework for this study due to:

- The tendency in QS firms to neglect strategic planning (Murphy, 2012), therefore any new framework should be simple and readily understood in order to maximise uptake. The Design School SWOT analysis model (discussed below) is well understood and remains popular in the business environment (Minsky & Aron, 2021).
- Strategy formation in QS firms, when it is undertaken, tends to be done top down, led by senior management (Murphy, 2012), which is consistent with the Design School premise that senior management, responsible for the performance of the company, should be the designers of strategy.

- The Design School premises reflect a highly structured yet simple approach to Strategy formation:
 - This would fit with the formal structured processes typically seen in large international QS firms (Murphy, 2012), and;
 - Provide a usable framework for smaller local practices who tend to take a more informal ad-hoc approach lead by the managing director (Murphy, 2012)

2.4.2 SWOT Analysis

The strengths, weaknesses, opportunities and threats (SWOT) analysis is probably the most well-known approach to strategy formulation; it is an important tool for auditing the overall strategic position of a business and its environment. By understanding the external environment in which an entity operates, the organisation can achieve its goals by taking advantage of the opportunities while minimizing the threats (Friend & Zehle, 2009; Gillespie, 2019; Gurel & Tat, 2017; Morrison, 2021; Porth, 2003; Sarsby, 2016). SWOT analysis is the situation analysis technique most often applied in the Design School approach to strategy formation, to the extent that the two are often referred to interchangeably (Lohrke, Mazzei, & Frownfelter-Lohrke; Sarbah & Otu-Nyarko, 2014). Despite its origins dating back over seven decades, the design school and the associated SWOT analysis tool remain popular in strategic planning practices today (Gurel & Tat, 2017; Lohrke et al.; Minsky & Aron, 2021; Sarbah & Otu-Nyarko, 2014). A recent Harvard Business Review article notes that there are few management tools more ubiquitous than the SWOT analysis tool (Minsky & Aron, 2021)

SWOT analysis is widely regarded (Gillespie, 2019; Lohrke et al., 2021; Porth, 2003; Sarsby, 2016) as the focus of a situation analysis in the strategic planning process. It is part of the introspection and environmental scanning processes aimed at gaining deeper understanding of the strengths and

weaknesses of the organisation, as well as the opportunities and threats in the external environment. Strengths and weaknesses are internal factors to the organisation and represent their abilities or competencies and inabilities or incompetence, respectively, in responding to the external dynamics that have profound impact on their corporate goals and objectives. The opportunities and threats constitute the external dynamics or external factors. Opportunities have positive impact on the organisation's efforts to achieve corporate goals and so could be leveraged with the organisation's strengths. On the other hand, the threats have negative impact on the organisation's efforts to achieve corporate goals, primarily because they impact on the organisation's weaknesses.

Sarsby (2016) provides succinct definitions of key SWOT terms (p. 8-10) which provide helpful nomenclature for this study:

- Factor:** Relevant data or information.
- Internal factors:** Those which the organisation has control over. Strengths and Weaknesses are internal factors.
- External factors:** Those which the organisation has little or no control over
- Helpful factors:** Those that assist success. Strengths and Opportunities are helpful.
- Harmful factors:** Those that hinder success. Weaknesses and Threats are harmful.
- Strengths:** Strengths are internal and helpful in respect of the SWOT objective. Strengths are factors that support an Opportunity or overcome a Threat.
- Weaknesses:** Weaknesses are internal and harmful in respect of the SWOT objective. Weaknesses are factors that result in being unable to take advantage of an Opportunity or become vulnerable to a Threat.

Opportunities: Opportunities are external and helpful factors over which the organisation has no control but could support an existing Strength.

Threats: Threats are external and harmful factors over which the organisation has no control but could undermine an existing Weakness.

Matching: Matching connects the external factors – Opportunities and Threats – to the internal factors – Strengths and Weaknesses (refer also Figure 5 below).

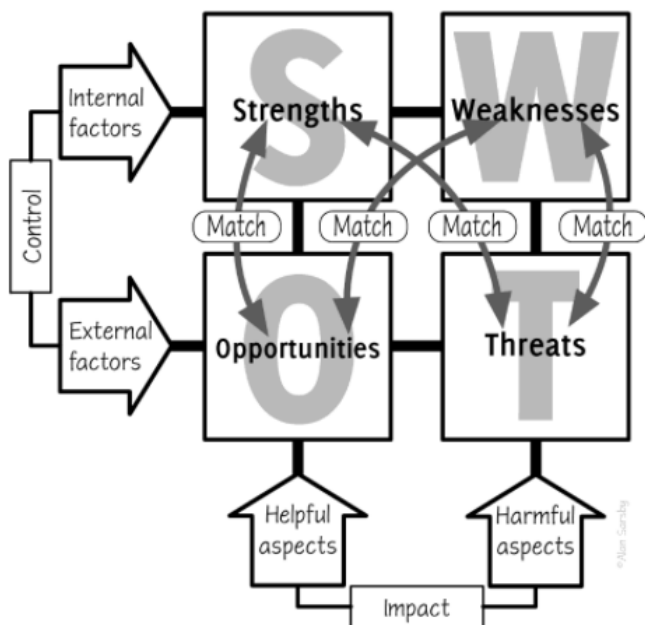


Figure 5: Potential matching between internal and external factors (Sarsby, 2016)

Matching is a key component of the SWOT analysis process (Friend & Zehle, 2009; Sarsby, 2016); Weirich (1982) and supports the central aim of a SWOT-based analysis which is to support decision makers to achieve the best possible matching of internal resources with external forces in order to achieve sustained competitive advantage; accomplished by:

- Leveraging strengths;

- Minimising or neutralising weaknesses;
- Exploiting opportunities, particularly where they can be matched with a firm's strengths; and,
- Countering or avoiding threats (Friend & Zehle, 2009).

A variant of the SWOT analysis tool is the TOWS matrix (Wehrich, 1982) which provides “a conceptual framework for a systematic analysis that facilitates the matching of external threats and opportunities with the internal weaknesses and strengths of the organisation” (p. 9). The matrix presents four conceptually distinct strategic avenues, namely:

1. The WT strategy: minimising both weaknesses and threats, as the confluence of both negative forces indicates areas where an organisation may be most vulnerable.
2. The WO strategy: minimising the weaknesses whilst maximising the opportunities. This may require addressing weaknesses which hinder the organisation from exploiting identified opportunities.
3. The ST strategy: maximising strengths, and to direct those strengths in such a fashion to enable the minimising of threats.
4. The SO strategy: maximising both strengths and opportunities. The converse of the WT strategy, this represents the coupling and exploitation of favourable internal and external factors (Wehrich, 1982).

| | | | |
|---|---|-------------------------------------|--------------------------------------|
| Step 1. * Prepare an Enterprise Profile: (a) the Kind of Business; (b) Geographic Domain; (c) Competitive Situation; (d) Top Management Orientation | | | |
| Step 4. Prepare a SW Audit in: (a) Management and Organization; (b) Operations; (c) Finance; (d) Marketing; (e) Other | | | |
| Internal Factors | <i>Step 5 Develop Alternatives</i> <i>Step 6. Make Strategic Choices</i> <i>Consider: Strategies, Tactics Action</i> <i>Steps 1 to 6. Test for Consistency. Also Prepare Contingency Plans. (Step 7)</i> | List Internal Strengths (S): (1) | List Internal Weaknesses (W): (1) |
| External Factors | | | |
| Step 2. Identify and Evaluate the Following Factors: (a) Economic, (b) Social, (c) Political, (d) Demographic, (e) Products and Technology, (f) Market and Competition Step 3. Prepare a Forecast, Make Predictions and Assessment of the Future | List External Opportunities (O): (Consider Risks Also) (1) | SO: Maxi-Maxi | WO: Mini-Maxi |
| | List External Threats (T): (1) | ST: Maxi-Mini | WT: Mini-Mini |

Figure 6: TOWS Analysis Matrix (Wehrich, 1982)

The strong case made in the literature for SWOT analysis as underpinning the long-term health of an organisation added to the rationale for its adoption in this study.

2.4.3 Quantitative Approaches to SWOT Analysis

This quantitative weighting of SWOT analyses is not entirely novel. Gillespie (2019) urges the ranking and weighting of SWOT variables in terms of their importance or relative impact as a key step. Some attempts to model this have been made. For example Inghenia's (2009) online quantitative SWOT

model allows the simple rating of relative weight of positive and negative factors to calculate the organisation's overall score. Anwar and Siddique (2000) add the consideration of long and short-term variations to their rating of the four SWOT quadrants which are weighted based on assessments of importance and the organisation's position relative to market leaders in regard to each factor. Shinno, Yoshioka, Marpaung, and Hachiga (2006) and (Miner, Dwivedi, Izlar, Atkins, & Kadam, 2021) developed quantitative SWOT analysis models that determines the intensity or priority in terms of technological and financial performance by employing Analytical Hierarchy Process using pair-wise comparison matrices.

These models (Anwar & Siddique, 2000; Inghenia, 2009; Miner et al., 2021; Shinno et al., 2006) do provide objective means for quantifying SWOT factors. However, none of them consider, or provide a means of quantifying the extent internal and external factors can be matched, nor the impact of this matching (the advantage gained from matching Strengths and Opportunities or the vulnerability of matched Threats and Weaknesses). The consideration of strengths and weaknesses in relation to the external threats and opportunities is central to Mintzberg's (2000) 'design school' of strategy formulation and acknowledged in existing concepts of OH (NHS, 2009).

2.4.4 Generic Frameworks of Internal and External Factors

The literature abounds with numerous high-level frameworks for practitioners to consider when canvassing the internal and external environments for helpful and harmful factors:

- **PESTEL** was originally known by the ETPS mnemonic covering four sectors of the external environment; Economic, Technical, Political and Social (Aguilar, 1967). Later authors (including Fahey, Narayanan, Morrison, Renfro, Boucher, Mecca and Porter) introduced various additional sectors including Legal, Environmental, International and Ethical

(Morrison, 2021). However, the most common variant in use today is PESTLE; Political, Economic, Sociological, Technological, Legal, and Environmental (Gillespie, 2019; Morrison, 2021).

- The ‘7P’s of marketing (Pistol & Tonis, 2017; Saidani & Sudiarditha, 2019) – these have their origins in the 4 P’s of Product, Price, Place and Promotion proposed in 1960 by E. Jerome McCarthy (Perreault & McCarthy, 1990), later extended to include People, Process and Physical evidence (Booms & Bitner, 1981).
- The ‘4C’s of marketing (Chawdhary, 2019; Sinha, 2018)– similar to the ‘7P’s’ but is considered more consumer oriented (Kotler & Keller, 2006): Consumer, Cost, Convenience and Communication (Lauterborn, 1990).
- The McKinsey ‘7S’s Framework (Salvarli & Kayiskan, 2018) – of Strategy, Structure, Systems, Shared values, Style, Staff, and Skills is often used for situation analysis of internal factors (Waterman, Peters, & Phillips, 1980).
- Porter’s Five Forces – looks to analyse the attractiveness of a given industry through consideration of five key forces within a market (Gillespie, 2019). These are: the bargaining power of suppliers; the threat of substitutes, the bargaining power of buyers, the threat of new entrants, and; industry rivalry (Michael E Porter, 1979).
- Wehrich’s framework (Gu & Kunc, 2019; Koontz, Wehrich, & Cannice, 2020) – covers both internal and external factors. The key internal factors are: Management & Organisation, Operations, Finance, Marketing and Other. Key external: factors are: Economic, Social, Political, Demographic, Products & Technology and Market & Competition (Wehrich, 1982).

- Sarsby's framework – Internal factors are Financial strength, Technology, Customer service, and People, external factors are Competitors, Social Trends, Technological changes and Legislation (Sarsby, 2016).
- Design School Internal and External Checklists (Tennent, 2020) – conceived by Power, Gannon, McGinnis, and Schweiger (1986) and immortalized by Mintzberg et al. (1998). The external environmental variables include: Societal, Governmental, Economic, Competitive, Supplier and Market changes. The internal strengths and weaknesses checklist lists Marketing, Research & Development, Management Information Systems, Management Team, Operations, Finance and Human Resources.

These frameworks serve to provide good checklists to ensure a good canvassing of the internal and external environments is achieved for the situation analysis. It is noted however that many of these frameworks are better suited to manufacturing or other non-professional services organisations, the main limitation, however, is that none of these generic frameworks have been adapted to provide a list of factors specific to QS firms (Frei et al., 2013).

2.5 SWOT Analyses of Quantity Surveying Firms

Beyond literature reviews (Frei & Mbachu, 2009, 2010; Mbachu, 2015), there has been little or no original primary research undertaken attempting to uncover what the real helpful and harmful internal and external factors are that exist for QS firms. Recently, Ramdav and Harinarain (2020) provided an analysis of the key strengths, weaknesses, opportunities and threats perceived to impact on the quantity surveying profession in South Africa. This study lists and predetermines several factors as either a strength, weakness, opportunity or threat, based on a limited review of the literature – then tests the

importance of each. The applicability of those finding to Australasian QS firms is limited as the study is undertaken in the South African context and focusses on impacts to the profession, rather than the success of firms. A small SWOT analysis was undertaken on small to medium QS firms in Malaysia (Kiong, 2013). Unfortunately, strengths and weaknesses were only tested in relation to five generic internal factors of: Manpower; Technology; Financial standing; Knowledgebase, and; Services. Similarly, threats and opportunities in the external environment were simply evaluated against the four broad factors of: Business environment; Economic; Sociological, and; Political elements – so the study provides little benefit to this research.

2.6 Critical Factors for Quantity Surveying Firms

This stage of the literature review was concerned with uncovering the key factors thought to impact on the success of QS firms. The purpose of this step was to generate a framework of key themes that could be used as a checklist to compare and contrast against the factors uncovered in the exploratory research stage (refer Chapter 4.0).

Searches were undertaken using Google Scholar, Scopus and the Massey University Discover databases. Searches were limited to scholarly peer reviewed articles; no date limits were set, and search results were sorted by relevance. The top 50 returns for each search were reviewed for relevance, firstly through review of title, and if warranted review of the article abstract. Articles that were found to hold relevant material were downloaded and added to an EndNote database and the full article analysed in detail to glean the key SWOT Factor themes.

The following key word searches were undertaken:

- Primary search term: “quantity surveyor” or “quantity surveying”

- Secondary search terms:
 - “success”
 - “strength”
 - “weakness”
 - “opportunity” or “benefit”
 - “threat” or “challenge”

The following table presents a summary of the literature analysed in detail with a matrix of both the input search terms and output themes derived from the review.

Table 3: Literature Search Matrix

| Literature | Input search keywords | | | | | | Output themes | | | | | | | |
|---|---|-----------------------|-----------------------------|----------|----------|---------|-------------------------|--------------|----------------------|----------------------|---------------------------|--------------------------------------|----------------------|-----------------------|
| | Quantity Surveyor (or) Quantity Surveying | Threat (or) challenge | Opportunities (or) benefits | Strength | Weakness | Success | Innovation & Technology | Competencies | Markets and Services | Knowledge management | HRM & employee engagement | Globalisation & internationalisation | Education & training | Marketing & relevance |
| (N. Z. Abidin et al., 2014) | * | * | | | | | | | * | | | | | |
| (Adesi et al., 2019) | * | * | | | | | | * | | | | | | |
| (Adeyemi & Oke, 2020) | * | * | | | | | | | | * | | | | |
| (Aibinu & Pasco, 2008) | * | | * | | | | | * | | | | | | |
| (Alauddin, Mamat, & Shukor, 2019) | * | * | | | | | | | * | | | | | |
| (Anh Nguyen, Thanh Nguyen, Tien Do, & Thanh Phan, 2020) | * | | * | | | | * | | | | | | | |
| (Babatunde, Adeleye, Perera, & Ekundayo, 2019) | * | * | | | | | * | | | | | | | |
| (Chamikara, Perera, & Rodrigo, 2020) | * | * | * | | | | | * | * | | | | | |
| (Chandramohan, Perera, & Dewagoda, 2020) | * | | * | | | | | * | * | | | | | |
| (Cornick & Osbon, 1994) | * | | * | | | | | * | | | | | | |
| (Harrison & Thurnell, 2015) | * | | * | | | | * | | | | | | * | |

| | | | | | | | | | | | | | | | | | | | |
|--|---|---|---|---|---|---|---|---|---|---|--|---|--|--|--|---|---|--|---|
| (J. O. Dada, 2017) | * | | * | | | | | * | | | | | | | | | | | |
| (Joshua Oluwasuji Dada & Jagboro, 2018) | * | | * | | | | | * | | | | | | | | | | | * |
| (Fortune & Skitmore, 1994) | * | | * | | | | | * | | | | | | | | | | | * |
| (Gunawardhana et al., 2019) | * | | | | | | | * | | | | | | | | | | | |
| (Hardie, Miller, Manley, & McFallan, 2005) | * | | | | * | * | * | | | | | | | | | | | | |
| (Harun & Torrance, 2006) | * | | * | | | | | | | * | | | | | | | | | |
| (F. Hassan, Ismail, Zaini, Hassan, & Maisham, 2011) | * | * | | | | | | * | | | | | | | | | | | * |
| (Hisham, Omar, & Zainordin, 2019) | * | * | * | | | | | | | | | | | | | | * | | |
| (Ibironke, Ekundayo, & Awodele, 2011) | * | | | | | * | * | | | | | | | | | | | | |
| (Jabar, Saif, & Fouad, 2020) | * | * | * | | | | | * | | | | | | | | | | | |
| (Jagun, 2006) | * | | * | | | | | | | * | | | | | | | | | |
| (Kamarazaly, Hock, King, Yaakob, & Tatt, 2019) | * | | * | | | | | | | * | | | | | | | | | |
| (Kehily & Underwood, 2017) | * | | * | | | | | * | | * | | | | | | | | | |
| (Kiong, 2013) | * | * | * | * | * | | | | | | | | | | | | | | |
| (Llale, Root, & Wembe, 2020) | * | * | | | | | | * | | | | | | | | | | | |
| (Mahamadu, Mahdjoubi, Manu, & Aigbavboa, 2020) | * | * | | | | | | * | | | | | | | | | | | |
| (Matipa, Kelliher, & Keane, 2008) | * | | * | | | | | * | | | | | | | | | | | |
| (Mayouf, Cox, & Gerges, 2019) | * | * | | | | | | * | | | | | | | | | | | |
| (Mbachu, 2015) | * | * | * | * | * | | | | | | | | | | | | | | |
| (Mohamed, Ye, Othman, Nor, & Hanid, 2018) | * | * | | | | | | | | | | | | | | | | | * |
| (Mustapa, Mustapa, Misnan, & Mahmud, 2012) | * | * | | | | | | * | | | | * | | | | | | | |
| (Nadeem, Wong, & Wong, 2015) | * | | * | | | | | * | * | | | | | | | | | | |
| (Nazif, Mustapha, & Ocheme, 2020) | * | * | | | | | | | | * | | | | | | | | | * |
| (Nkado & Meyer, 2001) | * | | | | | * | | * | | | | | | | | | | | |
| (Ofori & Toor, 2012) | * | * | | | | | | | | * | | | | | | | | | |
| (Ogunsina, Ekwus Obiegbo, & Adeniyi, 2018) | * | * | | * | | | | | | * | | | | | | | | | * |
| (A. E. Oke, Ibironke, & Bayegun, 2017) | * | * | | | | | | | | | | | | | | * | | | |
| (A. E. Oke, Ogunsemi, & Adeyelu, 2018) | * | | * | | | | | * | | | | | | | | | | | |
| (Ayodeji Emmanuel Oke, Ogunsemi, & Adeyelu, 2019) | * | | * | | | | | * | | | | | | | | | | | * |
| (Olatunji, Sher, & Gu, 2010) | * | * | | | | | | * | | | | | | | | | | | * |
| (Olawumi & Ayegun, 2016) | * | | * | | | * | | | | * | | | | | | | | | |
| (Ooi, 2018) | * | | | * | * | | | * | | | | | | | | | | | |
| (Perera, Pearson, Ekundayo, & Zhou, 2013) | * | | * | | | | | * | | | | | | | | | | | * |
| (Pheng & Ming, 1997) | * | | | | | * | | | | | | | | | | | | | * |
| (Ramdav & Harinarain, 2020) | * | * | | * | | | | | | | | | | | | | | | |
| (Seah, 2009) | * | | | * | | | | | | * | | | | | | | | | |
| (Seeley, 1984) | * | | | * | | | | | | * | | | | | | | | | |
| (Selinger & Stamler, 1983) | * | | * | | | | | * | | | | | | | | | | | |
| (Smith, 2004) | * | | | | * | | | * | | | | | | | | | | | |
| (Soon, Hassan, & Abidin, 2019) | * | | * | | | | | * | | | | | | | | | | | |
| (Tan Chin & Yeoh Kah, 2012) | * | * | | | | | | * | | | | | | | | | | | |
| (Tan Chin, Nik Nur Azirah Mohamed, & Yeoh Kah, 2018) | * | | * | | | | | | | | | | | | | * | | | |
| (Tan, Udejaja, Babatunde, & Ekundayo, 2017) | * | * | | | | | | | | * | | | | | | | | | * |
| (van Eck & Burger, 2019) | * | * | | | | | | | | | | | | | | * | | | |
| (C. Wang, Wood, Abdul-Rahman, & Ng, 2017) | * | * | | | | | | | | | | | | | | * | | | |

| | | | | | | | | | | | | | | |
|--|---|---|---|--|--|--|---|---|---|--|--|--|--|--|
| (Yaakob, Kamarazaly, King, & Qian, 2019) | * | | * | | | | * | | * | | | | | |
| (Yogeshwaran, Perera, & Ariyachandra, 2018) | * | | * | | | | | * | | | | | | |
| (Zainon, Mohd-Rahim, Aziz, Kamaruzzaman, & Puidin, 2018) | * | * | * | | | | * | | | | | | | |

The below table summarises the literature supporting each of the eight themes gleaned from the literature.

Table 4: Factors Affecting QS Firm Success – Key Themes Summary

| Key themes | Main authors |
|---|--|
| Core skills and competencies | (Chamikara et al., 2020; Chandramohan et al., 2020; J. O. Dada, 2017; Nkado & Meyer, 2001; Ayodeji Emmanuel Oke et al., 2019; A. E. Oke et al., 2018; Yogeshwaran et al., 2018) |
| Knowledge management | (Alauddin et al., 2019; Davis et al., 2007; Mohamed et al., 2018; Mustapa et al., 2012) |
| Innovation and technology | (Anh Nguyen et al., 2020; Babatunde, Babalola, Jimoh, & Ekundayo, 2018; Gunawardhana et al., 2019; Hardie et al., 2005; Harrison & Thurnell, 2015; Ibrionke et al., 2011; Jabar et al., 2020; Kehily & Underwood, 2017; Llale et al., 2020; Mahamadu et al., 2020; Matipa et al., 2008; Mayouf et al., 2019; Nadeem et al., 2015; Ooi, 2018; Selinger & Stamler, 1983; Smith, 2004; Soon et al., 2019; Tan Chin & Yeoh Kah, 2012; Yaakob et al., 2019) |
| Human resource management and employee engagement | (Adeyemi & Oke, 2020; A. E. Oke et al., 2017; Tan Chin et al., 2018; van Eck & Burger, 2019) |
| Globalisation and internationalisation | (Hisham et al., 2019; C. Wang et al., 2017) |
| Competition and the blurring boundaries of professions and market sectors | (N. Z. Abidin et al., 2014; Adesi et al., 2019; Chamikara et al., 2020; Harun & Torrance, 2006; Jagun, 2006; Kamarazaly et al., 2019; Nazif et al., 2020; Ofori & Toor, 2012; Ogunsina et al., 2018; Olawumi & Ayegun, 2016; Seah, 2009) |
| Education, training and continual professional development | (Joshua Oluwasuji Dada & Jagboro, 2018; Fortune & Skitmore, 1994; Harrison & Thurnell, 2015; F. Hassan et al., 2011; Nazif et al., 2020; Olatunji et al., 2010; Perera et al., 2013; Tan et al., 2017) |
| Recognition and marketing | (Frei & Mbachu, 2009; Ogunsina et al., 2018; Pheng & Ming, 1997; Smith, 2004) |

Each theme is reviewed and discussed in turn below.

2.6.1 Core Skills and Competencies

Core construction cost management skills, competencies and knowledge are what differentiates quantities surveying firms from other service providers.

Much research has been dedicated to defining the key competencies required of QS's (Chandramohan et al., 2020; Nkado & Meyer, 2001; A. E. Oke et al., 2018; Yogeshwaran et al., 2018). J. O. Dada (2017) undertook a survey of 445 QS's and associated stakeholders in Nigeria to distil the top three core competency areas for QS's: procurement and value management; commercial management, and; communication and entrepreneurship. In another Nigerian study, Ayodeji Emmanuel Oke et al. (2019), identified the costing of construction works; valuation, and; estimating and tendering; and procurement management as the top competencies required of QS's. Chamikara et al. (2020) summarized the core competencies expected by a number of QS professional institutes including the Australian Institute of Quantity Surveyors (AIQS) and the Royal Institution of Chartered Surveyors (RICS).

| Quantity surveying competency | AIQS (2012) | RICS (2014) |
|---|-------------|-------------|
| Basic/mandatory competencies (personal, interpersonal, professional practice and business skills) | ✓ | ✓ |
| Cost management | ✓ | ✓ |
| Contract administration | ✓ | ✓ |
| Procurement and tendering | ✓ | ✓ |
| Project financial control and reporting | ✓ | ✓ |
| Construction technology and environmental services | ✓ | ✓ |
| Project programming and planning | ✓ | ✓ |
| Conflict avoidance and management | ✓ | ✓ |
| Dispute resolution procedures | ✓ | ✓ |
| Capital allowances | ✓ | ✓ |
| Economic analysis | ✓ | ✓ |
| Cost planning | ✓ | ✓ |
| Due diligence | ✓ | ✓ |
| Insurance costing | ✓ | ✓ |
| Risk management | ✓ | ✓ |
| Quality assurance | ✓ | ✓ |
| Corporate recovery and insolvency | | ✓ |
| BIM | | ✓ |

Figure 7: Core QS Competencies (Chamikara et al., 2020), (p. 240)

A number of authors specifically focus on the core measurement, quantification and cost management aspects of the QS role (Durdyev, 2021; Ekung, Lashinde, & Adu, 2021). Fortune and Skitmore (1994) and Nadeem et al. (2015) both emphasise the importance of measurement expertise. Cornick and Osbon (1994) and Seeley (1984) emphasise the importance of quality in cost control while Aibinu and Pasco's (2008) and Ekung et al.'s (2021) focus is on cost planning and estimating. Durdyev (2021) recent work validates both the quantification and estimating aspects as key elements of cost control.

2.6.2 Knowledge Management

As construction cost knowledge brokers, successful knowledge management (KM) and transfer is critical to QS practice (Alauddin et al., 2019; Davis et al., 2007; Mustapa et al., 2012). However, a critical literature review by Davis et al. (2007) concluded that common practices undertaken to acquire and share knowledge are not enough to enhance employee knowledge to required levels. Reports indicated that nearly half of all quantity surveyors cannot acquire all the knowledge they need from the workplace and many organisations struggle to mitigate the loss of knowledge due to the retirement or resignation of key personnel. QS firms have been found to fail to fully exploit intranet technology to facilitate efficient KM (Mustapa et al., 2012); a key barrier was found to be the continual training and upskilling required for intranet-based knowledge management systems. The level of senior management support and relative firm size have been found to have the greatest influence on the success of KM systems in QS firms (Mohamed et al., 2018).

2.6.3 Innovation and Technology

Advances in technology are transforming the manner in which construction projects are delivered, Qs are expected to main abreast of Information Communication Technology (ICT) and conversant in the use of Building Information Modelling (BIM) technology.

The relatively low level of innovation exhibited by practitioners is generally considered a weakness. Quantity surveyors are regarded as more conservative and weaker innovators than their industry peers (Adegbembo & Moyanga, 2019; Hardie et al., 2005; Smith, 2004).

Computer aided technology has long been heralded as an opportunity for reducing the work involved in the measurement of building quantities (Selinger & Stamler, 1983). A Malaysian study found that by 2012, just under half of all QS firms surveyed had taken up computer aided measurement

technologies (Tan Chin & Yeoh Kah, 2012), a more recent study in Nigeria found similar levels of uptake; 47% of firms had adopted BIM for detailed cost estimating (Babatunde et al., 2018). There are fears that technology such as BIM threatens to replace some of the more process-oriented aspects of QS work, however, the simple response proposed is to adjust QS education and training to master BIM (Olatunji et al., 2010). There is a clear opportunity in leveraging ICT for firms that develop strengths with these technologies, but this is likely to be a threat for slow adopters (Ooi, 2018; Smith, 2004). Several further authors attest to the transformative role of ICT to QS practice and importance for QS firms to remain abreast of changes (Gunawardhana et al., 2019; Ibrionke et al., 2011).

BIM, specifically, is seen as an opportunity to: accelerate work and minimize errors (Anh Nguyen et al., 2020); enhanced visualization and design understanding (Babatunde et al., 2018; Harrison & Thurnell, 2015); ease the workload required to produce cost plans (Babatunde et al., 2018; Harrison & Thurnell, 2015; Matipa et al., 2008), particularly in terms of extracting building quantities (Nadem et al., 2015; Soon et al., 2019); integrate whole of life costing (Babatunde et al., 2018; Kehily & Underwood, 2017; Yaakob et al., 2019), and; ultimately provide a source of competitive advantage (Harrison & Thurnell, 2015). Jabar et al. (2020) demonstrated the advantages in simple quantitative terms – trials in their project aiming to design and deploy a web-based automated cost estimation system using, were able to achieve a 99% accuracy rate and reduce computation time down to three days compared what would take 19 days using excel based methods. Numerous further authors consider the impact of BIM on construction practices and further the notion that its uptake will provide a source of competitive advantage (Llale et al., 2020; Mahamadu et al., 2020; Mayouf et al., 2019)

The improved efficiency available to QS's through BIM quantity take-off is acknowledged (Zainon et al., 2018), but there are implementation challenges that must first be overcome based on findings in a Malaysian study (Zainon et al., 2018) – mainly to do with reengineering practices, processes and

behaviours to incorporate BIM technology. Harrison and Thurnell (2015) agree, pointing to the following barriers in a found in New Zealand case study: software inter-operability issues; BIM data incompatibility with standard QS estimating formats; lack of industry standards and protocols; the amount of manual quality assurance checking that still needed to be done; as well as ‘cultural’ resistance and training requirements.

2.6.4 Human Resource Management and Employee Engagement

Attracting and retaining high quality employees is a critical success factor for QS firms. The composition of the professional workforce is changing due to the growing number of millennials who now make up over 53% of the quantity surveying profession in South Africa (van Eck & Burger, 2019). It is therefore critical that employers understand millennial employees and what drives, motivates and engages them. Adeyemi and Oke (2020) point to successful mentoring schemes as a means for improving staff retention and engagement. Attention to appropriate matching for fit between mentor and mentee and provision of a supportive learning environment were found to be critical success factors to enable a mentoring programme to thrive. Explorations into the effectiveness of reward programs in engaging and retaining QS staff considered a range of financial and non-financial rewards (A. E. Oke et al., 2017). Rewards were found to be effective, with salary rewards considered the most effective, followed by career development opportunities. Noting the importance of QS staff retention and the link between relative levels of employee satisfaction and employee turnover, (Tan Chin et al., 2018). Main points of dissatisfaction were found to stem from failure to meet expectations regarding rewards, career opportunities and engagement in business level decision making.

2.6.5 Globalisation and Internationalisation

There is increasing opportunity, particularly in knowledge-based industries, to trade across traditional geo-political borders. Strong internal capability, the ability to provide innovative value-adding solutions, target market awareness and the ability to secure revenue through key local contracts are seen as critical success factors for internationalising QS services (C. Wang et al., 2017). Concerns from QS firms considering moves into international markets include the political stability of the target market, local rules and regulations, true understanding of market size and growth, as well as overcoming cultural differences (Hisham et al., 2019).

2.6.6 Competition and the Blurring Boundaries of Professions and Market Sectors

The blurring boundaries between professions and the mobility of professions to provide services to associated sectors is both a threat and opportunity for QS firms. At the same time the intensifying competition for various reasons has the natural tendency of eroding the opportunities available to QS firms (N. Z. Abidin et al., 2014; Adesi et al., 2019; Ofori & Toor, 2012)

The dynamic nature of markets provides an opportunity for QS firms to diversify their service offering into associated disciplines (Chandramohan et al., 2020). Kamarazaly et al. (2019) identified an opportunity for QS firms to amalgamate other disciplines such as project management, life cycle costing and strategic asset management into their service offering. Adesi et al. (2019) agree that QS firms must diversify their service offering but notes an apparent unwillingness from firms to move into non-building sectors such as oil and gas.

Increasing calls for industries to integrate an environmentally conscious approach to their practices and methods extends to QSs in the construction industry (Seah, 2009). However, Chamikara et al. (2020) in their Sri Lankan study, identified that QS's first needed to develop competencies in key areas

(including construction technology and environmental services) to add value in sustainable construction. Though there are barriers to adoption due to BIM still being an emerging technology, Kehily and Underwood (2017) and (Yaakob et al., 2019) point out the opportunity for QS firms to integrate life cycle (whole of life) costing into BIM cost modelling. Nazif et al. (2020) highlight the importance of integrating environmental sustainability studies into QS curriculums in order to leverage these opportunities.

Diversification into related industries; internationally, the infrastructure development, petro-chemical (Jagun, 2006) marine, manufacturing and transportation (Harun & Torrance, 2006) sectors all hold significant opportunities for the profession to apply its cost consultancy services. A number of barriers that needed to be overcome for QS's to be able to transfer their skills from the building construction to the civil infrastructure sector (Olawumi & Ayegun, 2016). The key challenges were sector specific skills and knowledge, competencies, identity and brand recognition. The presence of incumbent engineering firms protecting their market share is noted (Ogunsina et al., 2018) as another barrier.

2.6.7 Education, Training and Continual Professional Development

Traditionally, the key focus of QS education has been centred on measurement and quantification (Fortune & Skitmore, 1994), however, education and training must evolve in response to changing needs. Unfortunately, Perera et al. (2013) identify a “tripartite pull from academics, industry and professional bodies pull” (p. 143) in regard to what is required in QS training and education; which leads to a heightened risk misunderstandings or even competency gaps. (F. Hassan et al., 2011) and Perera et al. (2013) both observed a concerning lack of standardization even among RICS accredited QS training programmes.

BIM education has been identified (Olatunji et al., 2010) as a theme that ought to be added to formal QS education. Unsurprisingly, practitioners also identified training and upskilling was seen as a key enabler (or barrier if not provided) for leveraging the opportunities associated with BIM (Harrison & Thurnell, 2015). Tan et al. (2017) and Nazif et al. (2020) both note environmental sustainability studies as an area that must be integrated into QS curricula in response to the rise global awareness and demand for sustainability services.

It is important that professional competency is subjected to periodic evaluation. To this end, Joshua Oluwasuji Dada and Jagboro (2018) have devised a framework to link education with professional capability and professional development for QS's.

2.6.8 Recognition and Marketing

The relative obscurity of the profession is a notable issue in many markets including Australia and New Zealand (Frei & Mbachu, 2009; Smith, 2004). The lack of effective marketing at a profession-wide level as a key limiter to the profession's profile {Ogunsina, 2018 #102}. The observation is not new, Pheng and Ming (1997) noted that despite the profession having reached maturity, firms have failed on the whole to implement successful strategic marketing efforts and proposed a strategic marketing mix specific to QS firms.

2.7 Existing Concepts of Organisational Strategic Health

The purpose of this section of the Literature Review is to review the extant organisational health (OH) theories and identify applications of the literature that could be borrowed from, to develop the conceptual health-check model proposed in this study.

2.7.1 Organisational Health

Existing concepts of organisational health are often considered analogous to the health of an individual. The identified parallels between human health and organisational health (OH) include the following (Eray, Haas, & Rayside, 2019; Frei et al., 2013; Humphreys, Mian, & Sidwell, 2004; Özer, Uğurluoğlu, Saygılı, & Songur, 2019; Singh & Jha, 2018; Weippert, 2009):

- health levels influence performance;
- health levels have observable symptoms;
- health can be diagnosed through assessment of symptoms and comparison to established norms;
- ill-health symptoms are not always presented;
- health levels change over time;
- ill-health can be remedied by suitable interventions, and;
- timely correction of ill-health can halt the growth of a larger problem.

Viewing organisations as living organisms, allows for measures that capture the full state of an organisation, including its capacity to respond to and operate within external conditions {Xenidis, 2014 #29}. A key concept illustrated by this ‘human health’ analogy is that organisations are affected by, and therefore must respond to changes in their operating environment (Duan, Krishnan, & Weddle, 2017; Gagnon, John, & Theunissen, 2017; NHS, 2009).

Perhaps unsurprisingly, much of the literature around OH comes from the human health sector (Khammarnia, Baghbanian, Mohammadi, Barati, & Safari, 2013; NHS, 2009; Nicolay, 2014), where the metaphor is perhaps most natural and intuitive.

There are two main theoretical schools of organisational health theory found in the literature:

1. The workplace health school – concerned with workplace health and wellbeing and operates under the premise that healthy individuals are a prerequisite for organisational health. A healthy organisation is regarded as one that emphasises, facilitates and supports the health of its members, and that the wellbeing of these stakeholder is critical to the organisation's performance and success (Alman, 2010; Lovey et al., 2003; NHS, 2009; Quick et al., 2007; Zweber, Henning, & Magley, 2016).
2. The systemic school – championed by McKinsey & Company; this paradigm subscribes to a more 'systemic' perspective, where the health of the organisation is only observable in the emergent whole organisation and cannot be reduced to the health of its constituent employees or parts (Alman, 2010; De Smet, Palmer, et al., 2007; De Smet, Schaninger, & Smith, 2014a; Duan et al., 2017; Gagnon et al., 2017; NHS, 2009). As stated by Hill (2003) "the health of each subsystem affects the organisation's overall effectiveness (p. 1)".

Some authors have taken a dualistic approach, crediting both the workplace health and systemic schools. A NHS (2009) review of the literature that has developed around the concept of OH characterises a healthy organisation as one that can withstand the impacts of its operating environment and anticipate and adapt to change. The review found that two key conceptual paradigms of OH have developed. The first, emerging from the field of workplace health, espouses an 'atomistic' perspective of OH where the health of an organisation is reduced to the health of the individuals in it. Similarly, Alman (2010) points out that that OH reflects two components: the satisfaction and well-being of employees, and; the performance of the organisation as a system.

Evidence of any attempts to introduce the concept of OH to firms in the construction sector is scant. Literature in this regard is limited to checklist-type health-checks applied either to a specific application

of business practice or to the health of construction projects rather than organisations (Bello, 2018; Humphreys et al., 2004; Male, 2003).

There is no one broadly accepted definition of organisational health. M. B. Miles (1995), writing about change processes in public schools for the Centre for the Advanced Study of Education Administration at the University of Oregon, defined organisational health as follows:

“A healthy organisation in this sense not only survives in its environment, but continues to cope adequately over the long haul, and continuously develops and extends its surviving and coping abilities. Short-run operations on any particular day may be effective or ineffective, but continued survival, adequate coping and growth are taking place (p. 17).”

A healthy organisation as one that can absorb shocks and knocks from the wider system it operates in and be able to adapt quickly in response to changes in the external environment. However, claims that a key requirement when assessing OH is that the organisation’s relative functioning is accounted for in relation to its environment “as organisations are not healthy or unhealthy in isolation” (p.6). The NHS report also makes a valid distinction between current and future health of an organisation by claiming that the current health of an organisation is characterized by the extent of its grip on current performance, while future health depends on how it addresses its risk factors or prognosis for the future, i.e. the momentum it is generating to secure its strategic future in a changing world {Nicolay, 2014 #205} {NHS, 2009 #148}.

OH in the context of McKinsey’s organisational-health index {De Smet, 2014 #149} is defined as:

“The capacity to deliver—over the long term—superior financial and operating performance (p. 1).”

In summary, the authors agree that organisational health should be considered in reference to the external operating environment and capture the elements of an organisation that determine successful performance in a future state.

Several shades of opinions exist on the key determinants of organisational health. M. B. Miles (1995) proposed a checklist of second-order system properties essential for OH, and that transcend other measures of short-term efficiency. These 10 properties continue to be used by present day scholars to assess levels of OH (E. Clark & Fairman, 1983; Khammarnia et al., 2013):

1. Goal focus: acceptance of goals and objectives
2. Communication adequacy: efficient and distortion free communication
3. Optimal power equalization: equitable distribution of influence
4. Resource utilization: the ability to coordinate inputs with minimal strain
5. Cohesiveness: sense of identity at the individual and group level
6. Morale: levels of wellbeing, satisfaction and pleasure
7. Innovation: the ability to innovate and risk-take
8. Autonomy: the ability to maintain goals and ideals while managing external demands
9. Adaptation: the ability to maintain stability while managing external stressors
10. Problem-solving adequacy: the ability to perceive and solve problems

Strong organisational health depends on a balance across the following four dimensions {Nicolay, 2014 #205} {NHS, 2009 #148}:

1. interrelations among members of the organisation, the flow of resources among them and the unifying social networks;
2. organisational identity which includes clarity of purpose, shared goals and values, and clarity of function of each unit and its defined contribution to overall goals;
3. autonomy of the sub-units and the enabling organisational structure, and;

4. resilience, which includes adaptability, innovativeness, problem-solving, and ability to respond to change without compromising core values.

Perhaps the most developed model of OH stems from research involving over 115,000 individuals from 231 companies undertaken by strategic management consultants McKinsey (De Smet, Palmer, et al., 2007). The authors were able to distil nine core management dimensions, which if mastered, significantly increase organisations' chances of higher than average financial earnings. These nine elements are summarized below:

| | |
|------------------------------|--|
| Accountability | Reporting relationships and performance measurement ensure that people are accountable for business results |
| Capabilities | Internal skills and talent are sufficient to support the company's strategy and create competitive advantage |
| Coordination, control | Business performance and risk are measured and reported |
| Direction | People understand and are aligned with where the company is heading and how to get there |
| Environment, values | The quality of employee interactions (eg, culture, workspace design) fosters a shared understanding of core values |
| External orientation | The company has constant 2-way interactions with customers, suppliers, partners, or other external groups to drive value |
| Innovation | The company generates a flow of ideas and embraces change so that it can sustain itself, survive, and grow over time |
| Leadership | Leaders at all levels shape and inspire the actions of employees to drive better performance |
| Motivation | Employees are inspired to perform and encouraged to stay with the company |

Figure 8: 9 key areas that support organisational excellence (De Smet, Palmer, et al., 2007)

The authors identified strong links between organisational health and financial performance. For example, companies in the top organisational health quartile, are 2.2 times more likely than companies in the bottom quartile to have higher than average EBITDA (earnings before interest, taxes, depreciation and amortization).

Further work by McKinsey, De Smet, Loch, et al. (2007), analysing 60,000 responses to an organisational-health survey yielded five overarching characteristics of business health. The authors did not establish a causal relationship between these factors and organisational health but argued that they nonetheless represent a coherent framework of characteristics present in ‘successful’ organisations. The five factors are:

1. Complementarity (i.e. complementary relationships among individuals and teams that are mutually reinforcing to create additional value);
2. Renewal (i.e. driving change to engender growth, innovation and ability to adapt to market shifts);
3. Alignment or unity of purpose;
4. Execution (i.e. having the core competencies and empowerment to make decisions and perform key tasks effectively); and
5. Resilience to external shocks and competitive threats.

McKinsey continues to monitor the organisational-health index and the correlations between OH and performance remain strong over the longer term since data gathering began in the 2003 (De Smet et al., 2014b; Duan et al., 2017; Gagnon et al., 2017).

A key limitation of the existing OH theories, are that they take an exclusively resource-based view (RBV) of organisations – essentially ignoring the external operating environment.. A common

criticism of the RBV is that its claims are largely untestable, often due to the methodological complications related to measuring resources, particularly as some are intangible (Almarri & Gardiner, 2014; J. B. Barney et al., 2011; Bromiley & Rau, 2016; Kellermanns et al., 2016; Kraaijenbrink et al., 2010). A second criticism is that it ignores the impact of the external environment and any interactions between internal and external factors (Almarri & Gardiner, 2014; Hitt, Xu, & Carnes, 2016).

Despite its limitations, the OH term has been adopted by subsequent authors and remains relevant as evident from recently published research (Özer et al., 2019; Singh & Jha, 2018) which build on the concept. However, the existing literature does not offer any developed frameworks determining OH based on a rigorous quantitative assessment of the Internal and External Factors affecting an organisation's performance; in fact, the external perspective is often largely ignored altogether.

2.7.2 Organisational Strategic Health

Strategic health is a related, albeit even lesser-known concept that can be found sparsely scattered throughout the literature.

Early references to strategic health {Hofer, 1980 #348} describe a long range view of organisational health that considers four key facets of firm performance: financial condition; market position; technological stance; and; production capability. Hofer differentiates strategic health from operational health which is mainly concerned with short term financial performance.

Almost two decades later, an article in the Long Range Planning journal (T. Clarke, 1998) urged managers to consider not only short term financial health but also 'strategic health' – no definition of strategic health is given but the author implies a longer term, multi-stakeholder view of organisational health (as opposed to a short-term shareholder value focussed view). Around the same time, Markides (1998) defined strategic health as “a company's future health that could be different from today – as

measured by its financial health (p.35)”. Markides warns that financial health may not be a good predictor of the organisations’ future state and recommends managers identify the early warning indicators relevant to their business that might predict future conditions and performance.

More recently, Drory (2017) defined strategic health as an organisation’s ability to achieve sustainable competitive advantage. Drory proposes a strategic diagnosis framework that assesses four key areas of firm performance:

- Competitive strategy: the organisation’s value proposition
- Processes: the predetermined steps designed to meet the organisation’s key desired outcomes
- People: skills, management capability, culture
- Structure: organisational structure effectiveness

Drory posits that high levels of performance in terms of these four aspects means an organisation is well positioned to achieve and maintain competitive advantage. In summary, the literature consistently describes strategic health as an organisation’s long term ability to survive and provide value to stakeholders (T. Clarke, 1998; Drory, 2017; Hofer, 1980; Markides, 1998).

2.8 Measures of Success in For-Profit Organisations

By definition, for-profit organisations exist in order to make sustainable profits. It follows therefore that financial metrics such as profitability (measured as earnings before interest, taxes, depreciation and amortization – EBITDA) and growth are the key measures for proving the success of organisational health tools. The literature is replete with best practice guidance for analysing financial profit and growth metrics in business performance (Bogetoft, 2012; De Smet, Loch, et al., 2007; Deac,

2018; Holland & Matthews, 2018; Korsager, 2019; La Rosa, 2021; McLaney, 2016). Growth has been used as a proxy for success in several studies. Research by H. Hassan et al. (2007) on the impact of strategic planning on QS firms chose self-reported measures of growth in (1) profit, (2) staffing, and (3) client base. The authors selected a range of indicators in cognisance of the fact that any one indicator may not reflect the intentions of every business (such as a small firm that did not wish to expand further in terms of number of employees).

Several authors (Neely, Adams, & Kennerley, 2002; Nogning & Gardoni, 2017; Severgnini, Galdamez, & Camacho, 2019) highlight the importance of stakeholder satisfaction. Stakeholders include employees, customers and owners. Considering employee and customer satisfaction alongside the profit returned to shareholders, could provide a richer picture of success. As the primary source of business revenue, much research continues to be dedicated to the importance of client or customer satisfaction to achieving and sustaining competitive advantage (Arslan, 2020; Hamzah & Shamsudin, 2020; Uvet, 2020) and ultimately profitability (Hoyer, MacInnis, & Pieters, 2001) (Mei, Li, & Li, 2017; Rosli & Nayan, 2020). Studies collating over 20,000 customer satisfaction survey identified correlations between relative levels of customer satisfaction and revenue (Coldwell, 2001). Satisfied clients have been shown to not only provide repeat business, but also promote the business through word of mouth, providing further sources of revenue (Mei et al., 2017; Rosli & Nayan, 2020; Zairi, 2000).

Employee satisfaction is considered essential to the success of any business (Gregory, 2011). Engaged and motivated employees may be the most powerful source of competitive advantage an organisation can wield {Woodruffe, 2006 #256}. This is supported by (Sila & Sirok, 2018), who found that the level of employee satisfaction and engagement has a direct effect on the organisation's overall effectiveness and both Markos and Sridevi (2010) and Anitha (2014) who identified correlations between relative levels of employee engagement and organisational performance.

The table below summarises the measures of success adopted for this study:

| Success Proxies | Literature (authors: keywords) |
|--------------------------------------|--|
| 1. Client stakeholder satisfaction | (Neely, Adams, & Kennerley, 2002; Nogning & Gardoni, 2017; Severgnini, Galdamez, & Camacho, 2019: client is key stakeholder Mei et al. (2017), Hoyer et al. (2001): profitability Coldwell (2001); Rosli and Nayan (2020): increased revenue Mei et al. (2017); Zairi (2000): repeat business, word of mouth (Arslan, 2020; Hamzah & Shamsudin, 2020; Uvet, 2020): for sustained competitive advantage |
| 2. Employee stakeholder satisfaction | (Neely, Adams, & Kennerley, 2002; Nogning & Gardoni, 2017; Severgnini, Galdamez, & Camacho, 2019 : employee is a key stakeholder Woodruffe (2006): employee satisfaction drives competitive advantage Gregory (2011): employee satisfaction drives overall success Sila and Sirok (2018): employee satisfaction drives organisational effectiveness Markos and Sridevi (2010)and Anitha (2014): employee satisfaction drives effectiveness |
| 3. Profitability & 4. Growth | De Smet, Loch, et al. (2007): profit (EBITDA) and growth as measures of success (Neely, Adams, & Kennerley, 2002; Nogning & Gardoni, 2017; Severgnini, Galdamez, & Camacho, 2019: owner satisfaction (H. Hassan et al. (2007): growth in profit, staffing, and client base (Bogetoft, 2012; Deac, 2018; Holland & Matthews, 2018; Korsager, 2019; La Rosa, 2021; McLaney, 2016): financial metrics for measuring profit and growth |

2.9 Key Findings and Gaps in Existing Knowledge

This literature review has provided an overview of the concept of strategy in the literature, including a review of the main theories regarding the nested concept of strategic management and strategic planning (Gillespie, 2019; Mintzberg et al., 1998; Porth, 2003). Particular focus was given to Design School tools for strategy formation – particularly SWOT-based situation analysis (Andrews, 1971; Gillespie, 2019; Learned et al., 1965). The key concepts of a SWOT analysis are the scanning of Internal and External Factors, and the matching of these helpful and harmful factors in a manner that enables the leveraging of strengths and the mitigation of threats, and draws attention to the possible undermining of weaknesses or missed opportunities (Sarsby, 2016; Wehrich, 1982).

The literature on strategic management and strategic planning approaches in QS firms was reviewed. A key observation was a distinct lack of recent and relevant research in this area. Key works in this field are Boon (1996, 2001, 2008), Jennings and Betts (1996) and Murphy (2012, 2016). Additional

helpful, but less comprehensive studies by H Hassan (2010); H. Hassan et al. (2007); Hasnanywati Hassan et al. (2008) and N. Z. Abidin et al. (2014); N Z Abidin et al. (2011) were also discussed. The most in depth study is Murphy (2012, 2016) who found that strategic planning in QS firms is ad-hoc and often entirely neglected, particularly in small to medium sized firms. This ad hoc tendency towards strategic planning is consistent with Boon's (2008) findings that strategic planning tended to be emergent rather than deliberate. When it is undertaken, strategic planning tends to be the domain of senior management and characterized by a top down approach. In larger firms where strategic planning was driven by head office requirements, systematic approaches were increasingly prevalent (Murphy, 2012, 2016). Murphy also observed that objectives and strategies were formed as a result of a scan of internal environments and competencies and external environments. The top down approach, the tendency towards systematic methods, and the consideration of Internal and External Factors is in line with the premises underpinning the design school approach to strategy formation ((Mintzberg et al., 1998).

The existing concepts and definitions of organisational health in the literature were reviewed; there are three main views of organisational health. The view that fits best with the objectives of this study and the design school approach to strategy formation is the systemic view which views organisations as a system (or collection of systems) that exists within, and must respond to, their external environment (Alman, 2010; De Smet, Palmer, et al., 2007; De Smet et al., 2014a; Duan et al., 2017; Gagnon et al., 2017; NHS, 2009). Evidence of any attempts to introduce the concepts of organisational health to firms in the construction sector are rare, or confined to limited checklists or focused the health of individual projects (Bello, 2018; Humphreys et al., 2004; Male, 2003) with limited relevance to the operation of organisations. A key limitation of the quantitative studies that have been undertaken regarding the key Factors determining organisational health (De Smet et al., 2014b; Duan et al., 2017; Gagnon et al., 2017), is that they tend to take an exclusively resource based view of

organisations which neglects the external environment Factors – as consideration that is critical in the design school approach to strategy formation (Andrews, 1971; Gillespie, 2019; Mintzberg et al., 1998).

The main measures of success in for profit organisations were unsurprisingly found to be financial profit and growth (Bogetoft, 2012; Deac, 2018; Holland & Matthews, 2018; Korsager, 2019; La Rosa, 2021; McLaney, 2016). There is, however, also a body of literature that also underlines the importance of considering the satisfaction of key stakeholders (Neely et al., 2002), including primarily clients (Arslan, 2020; Coldwell, 2001; Hamzah & Shamsudin, 2020; Hoyer et al., 2001; Uvet, 2020; Zairi, 2000) and employees (Anitha, 2014; Gregory, 2011; Markos & Sridevi, 2010; Sila & Sirok, 2018; Woodruffe, 2006).

A systematic review of recent literature regarding key Factors affecting QS firms yielded a succinct list of topical themes. Common areas of impact were cores skills and competencies; knowledge management; innovation and technology; human resource management and employee engagement and retention; globalisation and internationalisation; competition and the blurring boundaries of professions and industries; education, training and continuing professional development, and; recognition and marketing.

There is limited knowledge around strategic planning in professional services firms in construction. Only a handful of studies have investigated PQS firms and fewer still have developed models that QS firms could use, and certainly none that provided empirically tested frameworks for situation analysis. The most comprehensive studies of strategic management in QS firms tend to diagnose and categorise the extent of, and approach to strategic planning – rather than developing frameworks and tools to use for strategic planning (Boon, 2008; Jennings & Betts, 1996; Murphy, 2016).

While several studies abound on the key concepts of critical success factors, SWOT, situation analysis and organisational strategic health, there is absence of knowledge on how to translate the SWOT

analysis results into a quantitative process that models the interaction between Internal and External factors.

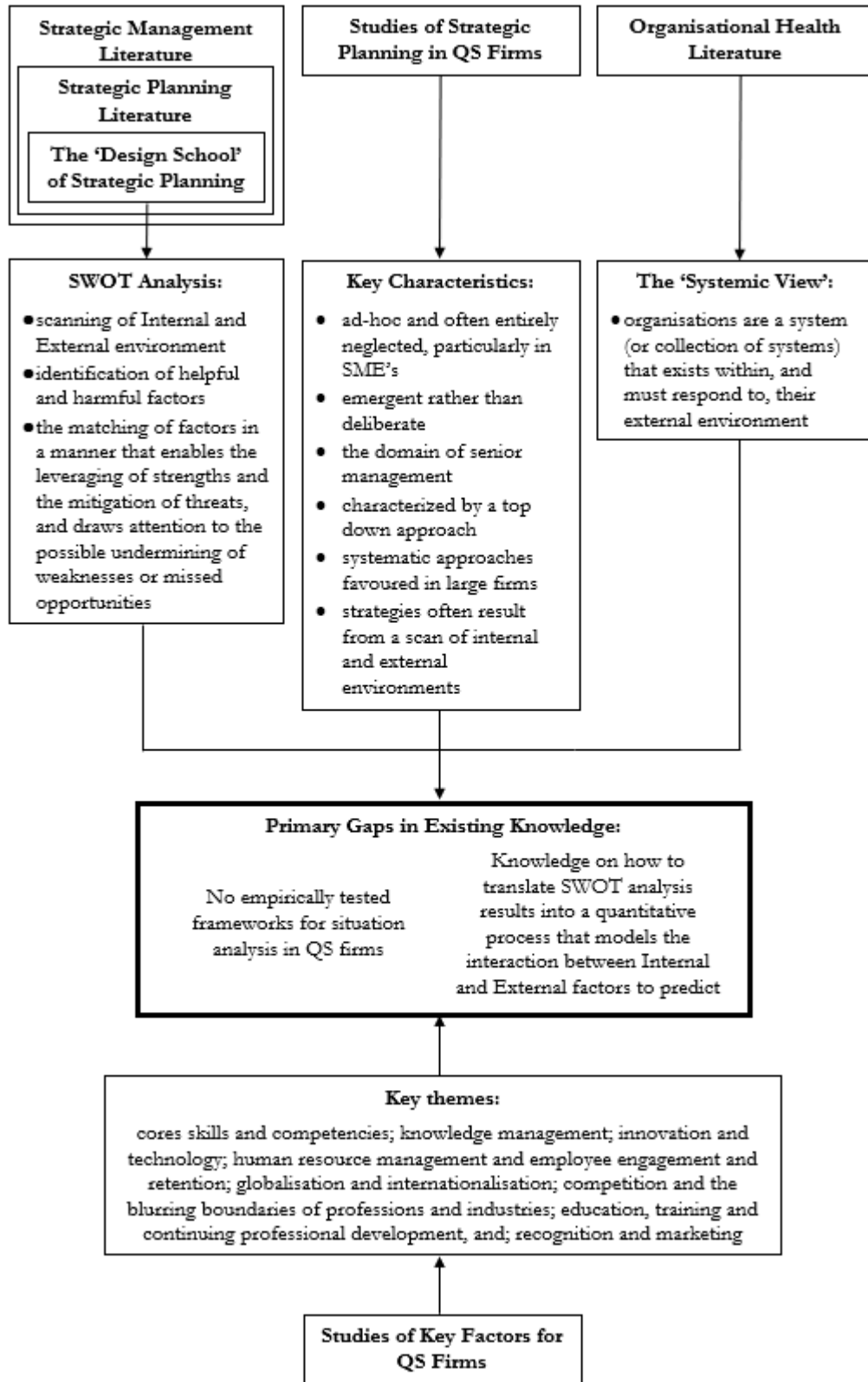


Figure 9: Summary of Key Findings and Gaps in Existing Knowledge

2.10 Development of Conceptual Model for the Study

2.10.1 Theoretical Framework

The theoretical framework this study draws upon is the Mintzberg (2000) defined 'Design School' or SWOT model of strategy formation process which is based on the premise that the most essential component of effective strategy formation is ensuring a fit between the external and organisational factors. In Mintzberg's model, strategy is created at the intersection of an external appraisal of the threats and opportunities facing an organisation in its external environment, considered in terms of the key factors for success, and an internal appraisal of the strengths and weaknesses of the organisation, which define the organisation's distinctive competencies. Using the model, Mintzberg argues that the key to survival is to exploit outside opportunities with inside strengths, while avoiding or minimizing exposure of the key weaknesses to the threats.

An organisation that achieves positive results in a situation analysis can be thought of being in a healthy state for carrying out the remaining steps in the strategic planning process, i.e.; strategically healthy.

The merging of these two theories is illustrated in the figure below:

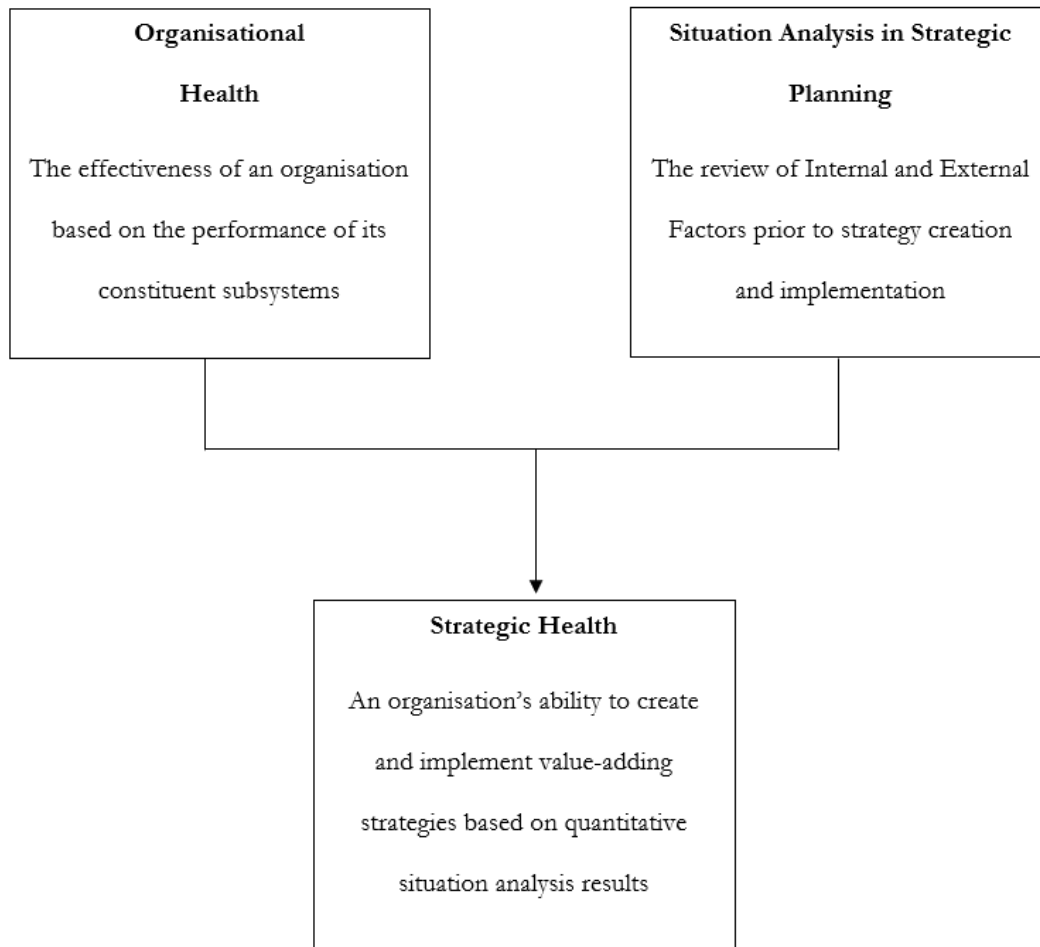


Figure 10: Theoretical Development of the 'Strategic Health' Concept

2.10.2 The Strategic Health Conceptual Model

Organisational Strategic Health (SH) was introduced as a concept relevant to QS firms by Mbachu and Frei (2011) in an article documenting the results of the pilot study preceding the main study documented in this thesis. The term was proposed to describe the health of an organisation in terms of its ability to devise and implement strategy based on the outcome of a quantitative situation analysis (SWOT) process. This literature review has reviewed the two main theories that provide the combine

basis for this concept; the Design School of Strategy Formation and the systemic view of Organisational Health.

The proposed conceptual model shares similar viewpoints with Mintzberg’s model in terms of the focus on SWOT (i.e. strengths, weaknesses, opportunities and threats) as the key determinants of success and survival of an organisation. However, the point of departure is that rather than feeding the outcome of the SWOT analysis directly to the formulation of the strategies, this study first applies the SWOT outcome to determine the strategic health condition of the organisation so as to identify the key areas of weaknesses where action is required and hence the appropriate strategies to formulate.

Figure 11 presents the conceptual ‘strategic health check’ model for the study as an essential component of the cyclical strategy formation and implementation process.

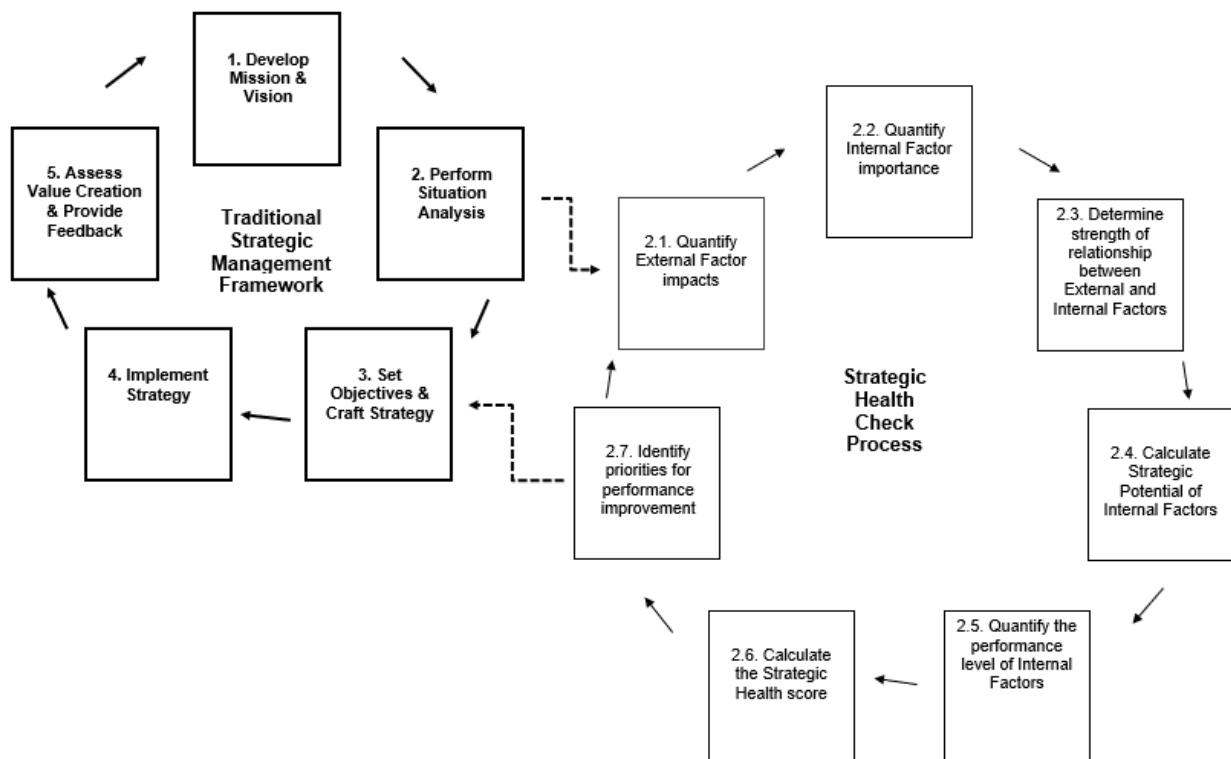


Figure 11: A model of the strategic management process showing the theoretical framework for the study as an integral part (amended from Porth (2003) and Mbachu and Frei (2011)).

In this regard, it is argued that the strategy formation process must start with the establishment of clearly defined corporate goals. Corporate goals are aimed at achieving stakeholder value propositions especially for employees, owners, customers and partners, by ensuring growth and survival of the organisation in the long run. Next, the industry dynamics are analysed, notably, client needs and preferences, industry trends and values, competitors and the levels of competition. Having set the goals and being abreast of the industry trends, there is a need to check whether or not the organisation is in a good strategic health condition to be able to achieve the strategic goals in the face of the constraints of the industry dynamics (Feldman, 2020; Gillespie, 2019; Porth, 2003).

The health check is also aimed at identifying any source of ‘ill-health’ or areas for improvement. This then feeds into the formulation of appropriate strategies not only for correcting the strategic health problem but also to get the organisation back on its feet to achieve the targeted goals. Following this, the optimum strategy will be selected, and the appropriate initiatives devised and implemented. This slightly differs from the viewpoints of some authors such as Johnson, Scholes, and Whittington (2008), van Wijngaarden, Scholten, and van Wijk (2012), Gurl (2017) and Teoli, Sanvictores, and An (2019) who emphasized only the matching of the external developments (i.e. opportunities and threats) with the internal capabilities (i.e. strengths and weaknesses) as a basis for devising strategic options without first assessing the implied strategic health condition and the implicit weak areas needing correction attention.

By reviewing the outcome of the implementation process during the monitoring process, the causes of deviation from the expected targets could be identified for early corrective action and/or revisiting of the original goals. The modified version of the strategic process adopted in the study also agrees with the views of Goldratt and Cox (2016) who argued that an effective process for achieving

organisational goals and ongoing improvement will involve a constant iteration of identifying the system's internal and external constraints and subordinating available resources to addressing the key constraints. The emphasis on SWOT as key determinants of organisational long-term health is also corroborated by the submissions of Gary Hamel (2002) and Hozack, Harman, Ferguson, and Howarth (2021) that in order to survive changes, organisations must anticipate and respond proactively to change in ways that enable the leverage of opportunities and avoidance or minimising of exposure to threats.



Figure 12: Matching of Helpful and Harmful Internal and External Factors

Figure 12 above illustrates the quantitative matching outcomes that occur as result of the pairing of Internal and External Factors in the Strategic Health model (using Sarsby's (2016) nomenclature):

- A matched Strength (helpful Internal Factor) and Opportunity (helpful External Factor) results in a 'Strength Leveraged'

- A matched Strength (helpful Internal Factor) and Threat (harmful External Factor) results in a 'Threat Mitigated'
- A matched Weakness (harmful Internal Factor) and Opportunity (helpful External Factor) results in an 'Opportunity Missed'
- A matched Weakness (harmful Internal Factor) and Threat (harmful External Factor) results in a 'Weakness Undermined'

2.11 Chapter Summary

This chapter has addressed the first step in the study, which is to review the approaches to strategic planning and decision making in QS firms. A review of the extant literature regarding strategic planning with a particular focus on the Design School approach including the popular SWOT analysis tool was presented. Existing concepts of organisational health were explored, and the main works summarised.

Research regarding approaches to strategic planning in QS firms, and the main themes regarding Internal and External Factors affecting QS firms were likewise reviewed and summarised. It was found that strategic planning in QS firms is often neglected or ad-hoc. The Design School of strategy formulation was identified as a suitable fit for QS firms given the preferences and approaches observed in the literature. A systematic review of recent literature regarding key Factors affecting QS firms yielded a succinct list of topical themes. Common areas of impact were cores skills and competencies; knowledge management; innovation and technology; human resource management and employee engagement and retention; globalisation and internationalisation; competition and the blurring

boundaries of professions and industries; education, training and continuing professional development, and; recognition and marketing.

The main gaps identified in the literature were: the lack of an empirically determined, comprehensive and specific Situation Analysis framework of Internal and External Factors relevant to QS firms when undertaking a situation analysis, and; the lack of applicable quantitative situation analysis models that could be used by QS firms for strategic planning. In response, a conceptual model centred on the Design School approach to strategy formulation and borrowing from the concept of systemic Organisational Health is was proposed for the development of a quantitative Strategic Health model.

3.0 RESEARCH METHODS

3.1 Chapter Introduction

The purpose of this chapter is to provide an outline of the approaches and techniques applied in the gathering and analysis of the data to address the research aims and objectives (Farrell et al., 2016; Naoum, 2013). The multi-stages of exploratory, descriptive; and evaluative research are outlined. The hypotheses proposed to address the research objectives are stated and the a-priori tests are described. Ethical concerns and considerations of reliability and validity are outlined, and mitigating strategies are described.

3.2 Research Strategy

This study takes a positivist epistemological stance, with an emphasis on the discovery of observable and measurable phenomena (i.e.: Factors). In terms of theory development, an abductive approach is taken – that is a combination of inductive and deductive approaches. The proposed conceptual model is deductively grounded in a framework of existing theory. In the exploratory stage however, an inductive approach is taken to developing a framework of key Factors. The development and testing of the Strategic Health model further subscribes to an abductive approach. In terms of the nature of the data gathered – a mixed methods strategy is taken in line with the abductive method. The exploratory stage is qualitative, followed by quantitative stages of descriptive and evaluative research. A combination of techniques including review of secondary literature, in-depth semi-structured interviews, descriptive surveys, and case studies are employed. The basic assembly of these individual techniques is outlined in the research strategy flowchart in Figure 13.

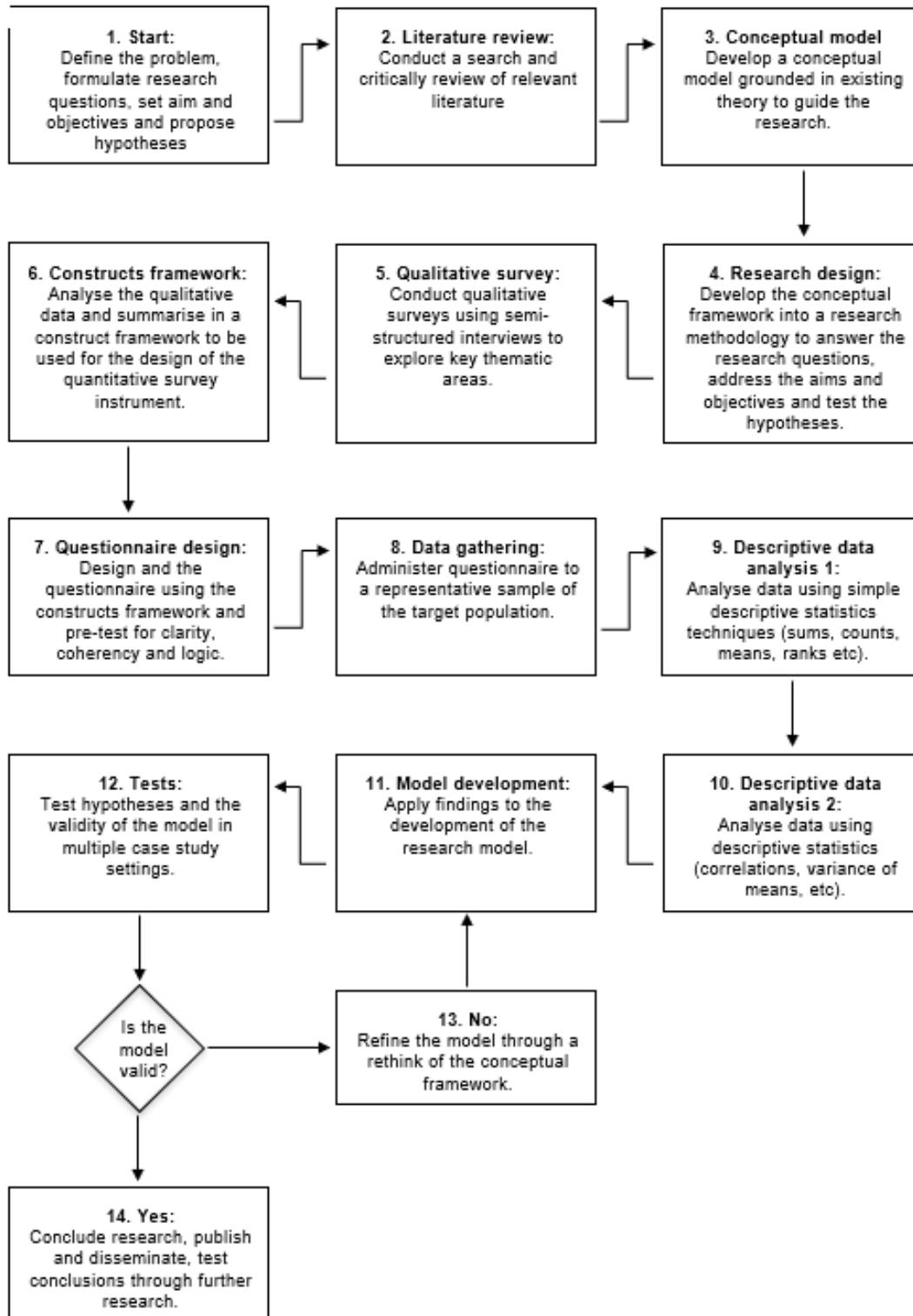


Figure 13: Research Strategy

Following a review of the literature, the research falls into three main stages of exploration, description and evaluation:

1. The exploratory stage – concerned with uncovering the key Factors influencing QS firm success that ought to be considered in strategic planning – applies qualitative methods of semi-structured in-depth interviewing (see Chapter 4.0);
2. The next stage following the interviews, is the descriptive stage, which is comprised of two stages of survey research aimed at quantitative description of the Factors uncovered in the exploratory stage (see Chapter 5.0), and;
3. The final stage is evaluative; testing the research models – developed using the descriptive data – in case study settings (see Chapter 7.0).

3.3 Hypotheses

An a-priori approach is taken to the research design and the setting of hypotheses. Hypotheses are clearly stated, testable and refutable propositions (Naoum, 2013; Saunders et al., 2016). Saunders et al. (2016) describe a hypothesis as “a testable statement that there is an association, difference or relationship between two or more variables. (p. 717)”

Simple exploratory and descriptive objectives do not require a hypothesis, but objectives that are concerned with understanding, explaining or testing a phenomenon benefit from a hypothesis statement (Naoum, 2013). There are nine hypotheses that have been formulated for the testing of results generated to address certain research objectives. Figure 14 below illustrates the development of this problem statement, through research questions, aims, objectives and ultimately testable hypotheses.

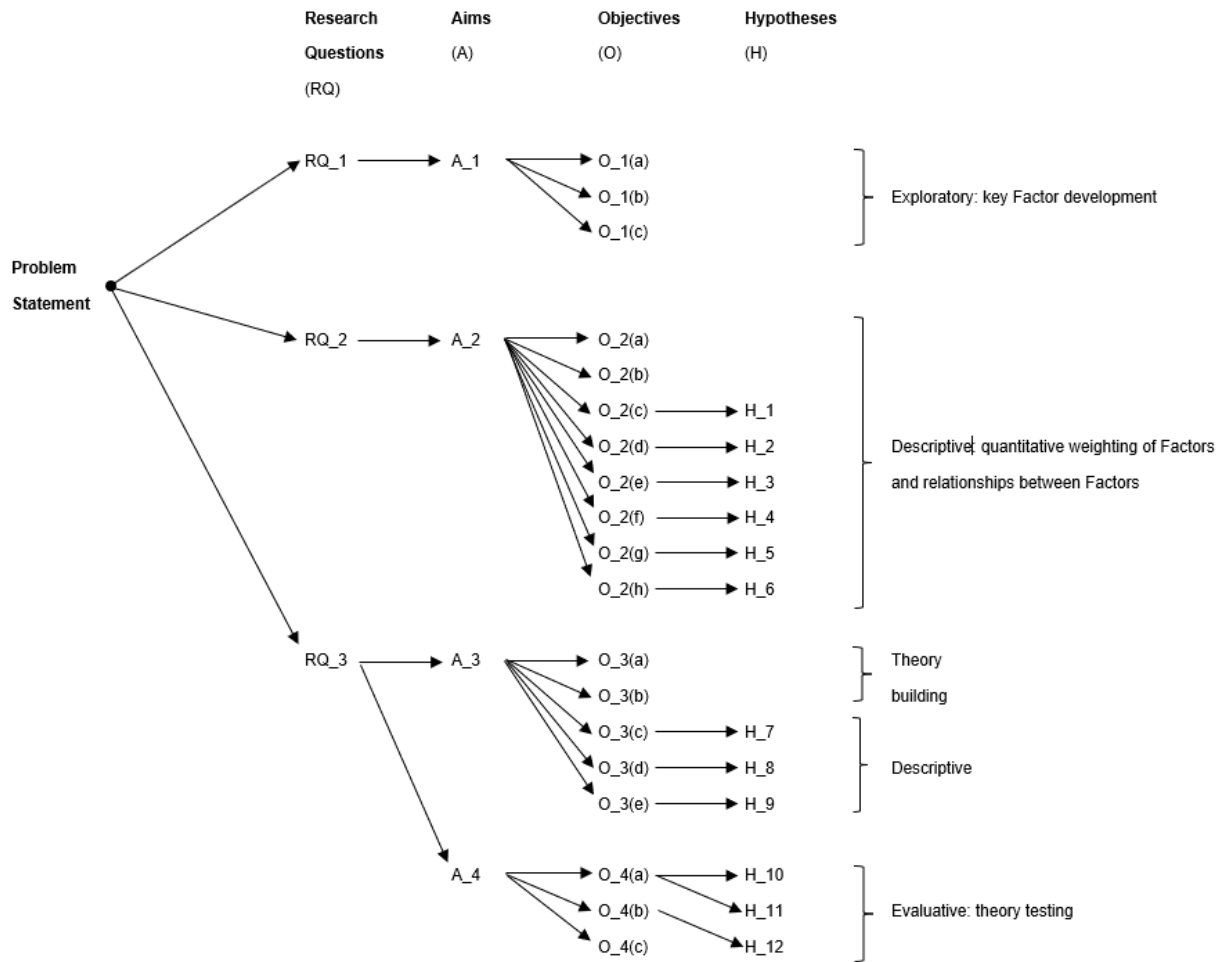


Figure 14: Research Problem-Hypothesis Tree

3.3.1 Hypothesis 1

The first hypothesis addresses objective 2(c) which is to establish whether perceptions of Internal Factor importance and External Factor impact change over time.

Where the perceived impact of the i^{th} (Internal or External) Factor in the original observation is expressed as F^{Obs1}_i and the perceived impact of that same Factor in the second-round observation is expressed as F^{Obs2}_i , then the null and alternative hypotheses are written as follows:

H1₀: There is no difference in perceived impacts of F^{Obs1}_i and F^{Obs2}_i

H1: There is a difference in perceived impacts of F^{Obs1}_i and F^{Obs2}_i

The results of the test of Hypothesis 1 are presented in section 5.5.1 of the Descriptive Research Results chapter.

3.3.2 Hypothesis 2

The second hypothesis addresses objective 2(d) which is to establish whether perceptions of Internal factor importance and External Factor impact are culturally specific.

To test this hypothesis, the responses of NZIQS member respondents will be compared with the responses of non-NZIQS members. Where NZIQS member respondents' mean score of on the perceived impact or importance of the i^{th} Factor is expressed as F^{NZ}_i and the mean score of non-NZIQS respondents on the perceived impact or importance of that same Factor is expressed as F^{NonNZ}_i , then the null and alternative hypotheses are written as follows:

H2₀: There is no difference in the perceived impact or importance of Fa^{NZ}_i and Fa^{NonNZ}_i

H2₁: There is a difference in the perceived impact or importance of Fa^{NZ}_i and Fa^{NonNZ}_i

The results of the test of Hypothesis 2 are presented in section 5.5.2 of the Descriptive Research Results chapter.

3.3.3 Hypothesis 3

The third hypothesis addresses objective 2(e) which is to establish whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders.

‘Internal stakeholders’ are defined as respondents that identified as consultant QS’s. All other respondents are defined as ‘external stakeholders’. Where internal stakeholder respondents’ mean score of the perceived impact or importance of the i^{th} Factor is expressed as F^{IntSH}_i and the external stakeholder respondents’ mean score of the perceived impact or importance of that same Factor is expressed as F^{ExtSH}_i , then the null and alternative hypotheses are written as follows:

H3₀: There is no difference in the perceived impact or importance of F^{IntSH}_i and F^{ExtSH}_i

H3₁: There is a difference in the perceived impact or importance of F^{IntSH}_i and F^{ExtSH}_i

The results of the test of Hypothesis 3 are presented in section 5.5.3 of the Descriptive Research Results chapter.

3.3.4 Hypothesis 4

The fourth hypothesis addresses objective 2(f) which is to establish whether perceptions of Internal Factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with carrying it out. It was identified in the literature that strategic planning in QS firms tended to be the domain of senior management. Years of experience was used as a proxy for ‘seniority’. In order to have two similarly sized groups of respondents, respondents with over 10 years’ experience were considered senior, while respondents with 10 years or less experience were considered non-senior.

Where senior level respondents’ mean score of on the perceived impact or importance of the i^{th} Factor is expressed as F^{Sen}_i and the mean score of non-senior level respondents on the perceived impact or importance of that same Factor is expressed as F^{NonSen}_i , then the null and alternative hypotheses are written as follows:

H4₀: There is no difference in the perceived impact or importance of F_i^{Sen} and F_i^{NonSen}

H4₁: There is a difference in the perceived impact or importance of F_i^{Sen} and F_i^{NonSen}

The results of the test of Hypothesis 4 are presented in section 5.5.4 of the Descriptive Research Results chapter.

3.3.5 Hypothesis 5

The fifth hypothesis addresses objective 2(g) which is to quantify the extent to which Internal Factors can be matched with External Factors resulting in strengths leveraged, opportunities missed, weaknesses undermined, and threats mitigated – in other words, to test whether a relationship exists between the perceived impact of External Factors and perceived importance of Internal Factors.

Where the perceived impact of the i^{th} External Factor (EF_i) is the independent variable, and the importance rating of the j^{th} Internal Factor (IF_j) is the dependent variable, then the null and alternative hypotheses are written as follows:

H5₀: There is no positive or negative relationship between changes in the relative impact of EF_i and the relative importance rating of IF_j

H5₁: There is a positive (or negative) relationship between changes in the relative impact of EF_i and the relative importance rating of IF_j

There are 28 Forces and 26 Attributes, so 728 Force-Attribute combinations will be tested. The results of the test of Hypothesis 5 are presented in section 5.5.5 of the Descriptive Research Results chapter.

3.3.6 Hypothesis 6

The sixth hypothesis addresses objective 2(h) which is to establish whether Force-Attribute relationships remain constant over time.

Where the rank ordered total correlation score of the i^{th} Internal Factor in the original observation is expressed as $IF^{Correl1RO}_i$ and the rank ordered total correlation score of that same Internal Factor in the second-round observation is expressed as $IF^{Correl2RO}_i$, then the null and alternative hypotheses are written as follows:

H6₀: There is no difference between $IF^{Correl1RO}_i$ and $IF^{Correl2RO}_i$

H6₁: There is a difference between $IF^{Correl1RO}_i$ and $IF^{Correl2RO}_i$

The results of the test of Hypothesis 6 are presented in section 5.5.6 of the Descriptive Research Results chapter.

3.3.7 Hypothesis 7

The 7th hypothesis address objective 3(c) which is to establish whether the ranking in Internal Factors in the ‘perceived importance-based’ model matches the ranking in the ‘External Force-matched’ model.

Where the rank ordered importance score of the i^{th} Internal Factor in the ‘perceived importance-based’ model (M1) is expressed as $IF^{ImportM1RO}_i$ and the rank ordered importance score of the i^{th} Internal Factor in the ‘External Force-matched’ model (M2) is expressed as $IF^{ImportM2RO}_i$, then the null and alternative hypotheses are written as follows:

H7₀: There is no difference between $IF^{ImportM1RO}_i$ and $IF^{ImportM2RO}_i$

H7₁: There is a difference between $IF^{ImportM1RO}_i$ and $IF^{ImportM2RO}_i$

The results of the test of Hypothesis 7 are presented in section 6.5.1 of the Developed Research Models chapter.

3.3.8 Hypothesis 8

The eighth hypothesis address objective 3(d) which is to establish whether QS firms' relative levels of performance of Internal Factors matches the order of importance of those Factors based on the 'perceived importance-based' model.

Where the rank ordered importance score of the i^{th} Internal Factor in the 'perceived importance-based' model (M1) is expressed as $IF^{ImportM1RO}_i$ and the rank ordered performance score of that Internal Factor in the original observation is expressed as $IF^{PerfIRO}_i$, then the null and alternative hypotheses are written as follows:

H8₀: There is no difference between $IF^{ImportM1RO}_i$ and $IF^{PerfIRO}_i$

H8₁: There is a difference between $IF^{ImportM1RO}_i$ and $IF^{PerfIRO}_i$

The results of the test of Hypothesis 8 are presented in section 6.5.2 of the Developed Research Model chapter.

3.3.9 Hypothesis 9

The ninth hypothesis addresses objective 3(e) which is to establish whether QS firms' relative levels of performance of Internal Factors matches the order of importance of those Factors based on the 'External Force-matched' model.

Where the rank ordered importance score of the i^{th} Internal Factor in the 'External Force-matched' model (M2) is expressed as $IF^{ImportM2RO}_i$ and the rank ordered performance score of that Internal

Factor in the original observation is expressed as $IF^{PerfIRO}_i$, then the null and alternative hypotheses are written as follows:

H9₀: There is no difference between $IF^{ImportM2RO}_i$ and $IF^{PerfIRO}_i$

H9₁: There is a difference between $IF^{ImportM1RO}_i$ and $IF^{PerfIRO}_i$

The results of the test of Hypothesis 9 are presented in section 6.5.3 of the Developed Research Model chapter.

3.3.10 Hypothesis 10

The tenth hypothesis is the first of two that address objective 4(b) which is to establish whether there is a positive correlation between their relative levels of modelled strategic health and success.

Where the level of firms' 'health' as diagnosed by the 'perceived importance-based' model is $H1$ and the level of firms' 'success' according to the i^{th} success measure is S_i , and the correlation between $H1$ and S_i is $H1-S_i^{Correl}$ then the null and alternative hypotheses are written as follows:

H10₀: $H1-S_i^{Correl}$ is zero

H10₁: $H1-S_i^{Correl}$ is positive or negative (greater or smaller than zero)

Noting that there 10 measures of success to be investigated, this hypothesis will be tested for each measure of success. The results of the test of Hypothesis 10 are presented in section 7.8.1 of the Evaluative Research Results chapter.

3.3.11 Hypothesis 11

The eleventh hypothesis is the second of the two that address objective 4(b). Hypothesis 11 tests the second, ‘External Force-matched’ model.

Where the level of firms’ ‘strategic health’ as diagnosed by the ‘External Force-matched’ model is ***H2*** and the level of firms’ ‘success’ according to the i^{th} success measure is S_i and the correlation between ***H2*** and S_i is $H2-S_i^{Correl}$ then the null and alternative hypotheses are written as follows:

H11₀: $H2-S_i^{Correl}$ is zero

H11₁: $H2-S_i^{Correl}$ is positive or negative (greater or smaller than zero)

As with the previous hypothesis, this hypothesis applies to all of the established measures of success so will be tested 10 times. The results of the test of Hypothesis 11 are presented in section 7.8.2 of the Evaluative Research Results chapter.

3.3.12 Hypothesis 12

The twelfth hypothesis addresses objective 4(c) which is to determine whether there is a closer relationship between the ‘External Force-matched’ model (***H2***) level of ‘strategic health’ and success than between the ‘perceived importance-based’ model (***H1***) level of ‘health’ and success.

The null and alternative hypotheses are written as follows:

H12₀: $H2-S_i^{Correl}$ is not greater than $H1-S_i^{Correl}$

H12₁: $H2-S_i^{Correl}$ is greater than $H1-S_i^{Correl}$

The results of the test of Hypothesis 12 are presented in section 7.8.3 of the Evaluative Research Results chapter.

3.4 Sampling

3.4.1 Exploratory Research Stage Sampling

The population of interest to the overall research study is the Australasian consultant quantity surveying community. As the purpose of the pilot study was to define the constructs which would be tested in the later research phases, it was decided that key persons in significant leadership roles would be the most appropriate subset of the population for participation in the study. The respondents were all key senior leaders drawn from a range of QS firms, professional institutes, and academic institutions.

Non-probability sampling is considered appropriate for exploratory research such as this (Saunders et al., 2016). The primary sampling technique employed was purposive sampling supplemented by snowball sampling (Cooper & Schindler, 2006; Saunders et al., 2016). The researcher relied initially on their own extensive networks, knowledge of the industry, and judgement to identify the members of the desired subset. Initially, directors of the leading QS firms were invited to participate. Following further recommendations from these respondents, the subset was snowballed to include directors of small and medium sized firms, as well as directors of relevant professional institutes and notable academics. The snowballing technique enabled the researcher access to a consistently high profile of respondent, which might otherwise have remained unknown or inaccessible (Saunders et al., 2016). It is reiterated that the purpose of this stage of the research was to ensure a broad canvassing of key factors rather than achieving representative and generalisable data. The approaches employed are considered suitable in instances where data cannot be collected from the full target population; there

are no existing sampling frames available,; statistical inferences are not required to be made and care is taken not to overgeneralize the findings, and; the purpose of the study is exploratory (Rubin & Babbie, 2017; Saunders et al., 2016).

As the statistical means of estimating errors and representative sample sizes used in random sampling do not apply to non-probability sampling (Sapsford, 2007) the final sample size of 15 was determined by the number of interviews that were required to achieve relative theoretical saturation. Theoretical saturation, a concept originating from the grounded theory is defined by Charmaz (2008) as the “saturation of the properties of a theoretical category” (p.167). This is within the recommended range of 5 to 25 suggested by Saunders et al. (2016) for semi-structured/in-depth interviews.

3.4.2 Descriptive Research Stage Sampling

The primary population of interest to the study are Australasian quantity surveyors. Members of the New Zealand Institute of Quantity Surveyors (NZIQS) and the Australian Institute of Quantity Surveyors (AIQS) were identified as an appropriate sampling frames for the target population. Response rates to questionnaires in the construction management field are notoriously low (Carter & Fortune, 2004; Ogunmakinde, Sher, & Maund, 2019). The NZIQS advised that a response rate of 2% should be expected with a response rate greater than 5% unlikely. Previous questionnaires undertaken by the researcher within the NZIQS target population have yielded response rates as high as 8%, however, the questionnaire in that case was considerably shorter and concerned a simpler subject matter. Census surveying was selected as the most appropriate sampling approach due to the anticipated low response rate and the institutes’ preferred approach to questionnaire distribution (inclusion of a synopsis of the study and link to the online questionnaire within fortnightly e-bulletin to members). This approach is supported by Saunders et al. (2016) when probability sampling is

desired and it is possible to collect data from the full target population. In addition, convenience sampling through the researchers' own LinkedIn networks was also undertaken to maximise the number of responses. Responses from the various sampling frames could be identified by the responses to the screening question at the start of the questionnaire that required respondents to indicate their professional institute affiliations (NZIQS, AIQS or other).

3.4.3 Evaluative Research Stage Sampling

The purpose at this stage was not to evaluate the effectiveness of the Strategic Health model through a series of case studies and care would be taken not to over-generalizable findings. The strategy for this stage was therefore to select a sample of relatively similar cases in order to be able to identify the effects of differences in performance on strategic health. Purposive homogenous sampling was selected as the appropriate sampling method. Saunders et al. (2016) suggests this approach in instances where data cannot be collected from the whole target population; there is no readily available sampling frame; the sample isn't required to proportionally represent the population; access is not difficult, and there is a focus on an in-depth observation (in this case the effect of Strategic Health performance on success). (Saunders et al.) recommends considering probability sampling when statistical inferences are required to be drawn, but this was not considered practicable in this instance for the reasons outlined above, so a limitation in this study is that the findings should not be generalized beyond the sample in the study.

Five cases were selected of firms with a similar number of employees, market position and orientation, geographic location, and ownership structure. Five cases allowed the selection of a group of firms with similar demographic characteristics within the researcher's network of contacts. There was also a consideration for limiting the burden of participation on what is a relatively small industry. A sample

of five cases is within the range of 4-12 cases suggested by Saunders et al. (2016) for non-probability sampling considering a homogenous population.

3.5 Data Collection

3.5.1 Qualitative Interview Data Collection

In-depth semi-structured interviews were selected as the appropriate data collection technique as recommended by Saunders et al. (2016). Semi structured interviews are particularly appropriate for exploratory studies have in addition to canvassing key questions this approach allows the probing of interviewees responses for an in depth understanding of phenomena or themes. Senior managers are thought to be More likely to accept an interview invitation rather than complete a questionnaire , particularly in instances where the topic is relevant and pertinent to their area of expertise (Saunders et al., 2016).

The interviews generally took place at the respondent's workplace, or over the phone, at date and time convenient to the respondent. Interviewees were provided with a Participant Information Sheet and required to complete a Participant Consent Form (refer Appendix A). The interviews lasted an average of 60 minutes and were recorded for transcription and analysis at a later date. The semi-structured interviews, focused on answering three core questions, were undertaken in a conversational manner.

The core questions put to respondents were:

1. What are the critical internal success factors required for the profession to remain relevant, competitive and successful in the long term?
2. What are the strengths and weaknesses of the profession?

3. What are the main external threats to the profession, and which of the profession's weaknesses make it vulnerable to these?
4. What are the main external opportunities for the profession and which strengths could be used to leverage these?

The conversational style allowed respondents to direct their response as they saw appropriate, increasing the opportunity for novel views to be shared and enrich the findings.

The recorded interviews were transcribed, and interviewees that had indicated they would like to sign-off on the transcripts, were sent a copy of the transcript together with a Transcript Release Form (refer Appendix A). All nine of the 15 interviewees that had requested transcripts approved these with no changes.

3.5.2 Quantitative Survey Data Collection

3.5.2.1 Questionnaire Design

In line with Saunders et al. (2016), self-administered web-based questionnaires were selected as the most appropriate collection tool for the quantitative data sought.

Questionnaires were used for two main phases of the study. Firstly, in the descriptive research stage, undertaken in two phases, and; secondly; in the evaluative research stage where questionnaires were administered to the case study firms. The questionnaires were based on the factor framework developed in as a result of the exploratory research stage. The questionnaire structure and format were discussed with research supervisors and pre-tested prior to administration to the target population.

The descriptive research stage questionnaires contained 26 Likert scale rating questions and up to seven demographic questions as well as opportunity to make 'other' qualitative comments.

Respondents were asked to rate the ‘importance’ and ‘performance’ of Internal Attributes on a 5-point Likert scale and the ‘impact’ of External Forces on a 7-point Likert scale (ranging from positive to negative impact). The questionnaires for the original observation in 2012, and the follow-up observation in 2020 are attached in Appendix B and Appendix C respectively. Minor differences in wording between the two is as a result of pre-testing feedback undertaken prior to the administration of the follow-up survey.

The evaluative research questionnaire applied to the case study firms was an amended version of the original observation questionnaire. This questionnaire contained 36 Likert scale rating questions and three demographic questions as well as opportunity to make ‘other’ qualitative comments. Respondents were asked to rate their organisation’s ‘performance’ of Internal Attributes on a 5-point Likert scale (ranging from positive to negative performance); relative levels of success, also on the same 5-point Likert scale, and; growth on a 7-point Likert scale ranging from ‘significant decrease’ (contraction) to significant increase (growth). A copy of the questionnaire is attached in Appendix D.

3.5.2.2 Informed Consent

All questionnaires were prefaced with a landing page containing information relating to the study including the research aims and the statement that participation was voluntary, and respondents had the right to skip any question or discontinue at any point. Information regarding ethics clearance, the opportunity for further comments and to request a summary of key findings were provided at the end of the questionnaires.

For the evaluative case studies, information sheets were first sent to the directors of the targeted case study firms together with a consent form agreeing to the questionnaire to be distributed to staff.

3.5.2.3 *Pre-testing*

Pre-testing is recommended as part of any good questionnaire design (Saunders et al., 2016). The descriptive survey questionnaire was pre-tested prior to both rounds of administration. The demographics of both sets of pre-testers and the results of any feedback are presented in Chapter 4.0 Exploratory Research Results as the pre-test feedback contributed to the refinement of the developed Factor framework.

The case study questionnaire was reviewed and pre-tested by the researcher and supervision team only as it was largely based on the previously administered original observation questionnaire.

3.5.2.4 *Questionnaire Administration*

For the descriptive survey, the questionnaire was administered to the AIQS and NZIQS sampling frames as well as to a third ‘undefined’ sampling frame. The purpose of this third sample was to provide QS’s and QS stakeholders not associated with the AIQS or NZIQS, but with an interest in the subject matter, to also provide their feedback. The chief means of distribution to the AIQS and NZIQS sampling frames was through inclusion of research invitations and remainder notifications in emailed ‘e-bulletins’ from those respective organisations. E-bulletin frequency is fortnightly which allowed for sending the first invitation and two follow-up reminders. To maximise penetration, notifications of the research were also posted on both organisations’ LinkedIn pages. In addition to these formal sampling frames, the questionnaire was also distributed via the researcher’s network through LinkedIn posts. The original observation questionnaire was hosted on the SurveyMonkey platform (see www.surveymonkey.com) and the follow-up observation questionnaire was hosted on Qualtrics (see www.qualtrics.com) in line with the licenses held by the supervision team at the time. The sampling windows for the both the original and follow-up observations was two months.

For the evaluative case studies, links to the questionnaire were sent to each of the five firm directors who then forwarded this on to their staff. The questionnaire was hosted on the SurveyMonkey site. The sampling window was one month.

At the end of the sampling window, the questionnaire results were downloaded from the online databases (SurveyMonkey and Qualtrics) in raw and summary formats in comma separated variables (.csv) and Microsoft Excel (.xls) file types. Copies of these files were saved in a Dropbox folder for archiving. Dropbox is a secure online data storing services. File security is achieved through encrypting files at rest using 256-bit Advanced Encryption Standard (AES), use of Secure Sockets Layer (SSL)/Transport Layer Security (TLS) to protect data in transit between Dropbox apps and servers, and two-step verification is provided for login security (Dropbox, 2020). The summary data .xls file containing all response data on a single spreadsheet tab was imported into a fresh .xls file and used for data preparation.

3.5.2.5 Steps taken to Maximise Response Rates

As recommended by (Saunders et al., 2016), specific steps taken in the questionnaire design to maximise response rates included:

- use of proprietary cloud-based survey software with formats compatible with a range of devices;
- distribution of questionnaires via professional institutes to underline the research's authenticity and support from reputable institutions;

- offering of incentives – based on the low numbers of responses received in previous iterations, the follow-up survey offered three randomly drawn \$150.00 gift card vouchers to intensive responses;
- sending of reminder notification to pick up any potential respondents that had missed this initial notification or not remembered to complete the questionnaire;
- offering a summary of key findings to respondents;
- allowing respondents, the choice of which parts of the questionnaire to respond to and the opportunity to break-off at any point, and;
- posting links to the questionnaire on LinkedIn pages to maximise penetration and reach.

3.6 Data Analysis

3.6.1 Analysis of the Qualitative Interview Data

Whilst the analysis of qualitative data is as much an art as it is a science, the adoption of tested methods can lend much scientific rigour and objectivity to what might otherwise threaten to descend into an overly subjective process (Rubin and Babbie, 2008). Content analysis techniques were employed in the examination of the qualitative data obtained in the interviews. Coding was employed to develop concepts from the qualitative data generated from the open-ended questions and effectively reduced the variety of answers to a small number of categories that provided the constructs for testing in later stages of the study. This process proved advantageous for ordering and categorising data as well as providing a system for management and retrieval, and recommended as such by Phillips (1971), Saunders et al. (2016) and Rubin and Babbie (2017).

In practice this was undertaken in the following steps:

1. Analyse each transcript, reducing the full narrative down to key words and phrases
2. Colour coding the transcripts of each respondent and combining the transcripts into one master document.
3. Introducing the key Factor themes uncovered in the literature review and working through the transcribed data, reordering text to fit under those themes where possible
4. Adding additional themes emerging from the data as new headings, iteratively re-sorting to allow the strongest themes to emerge
5. Introducing the main divisions of Internal Factors vs External Factors
6. Repeating step 3 until substantively all the data was allocated under a thematic heading as either an Internal or External Factor.

The output of this process is the framework developed in the Exploratory Research Results chapter.

3.6.2 Analysis of the Quantitative Survey Data

3.6.2.1 Removal of non-responses

The first step in data preparation was the removal of non-useful responses. Non-useful responses were any that did not contain responses beyond the screening question on the survey landing page (i.e.: no responses beyond question 1). For the original observation survey, this step reduced the total number of usable responses from 247 to 106. For the follow-up observation the number of usable responses was 137 from 308. No responses from the case studies were removed through this process.

3.6.2.2 *Re-coding*

IBM SPSS Statistics (SPSS) was the statistics software selected for analysing the data. SPSS requires data to be in numerical format for analysis.

Nominal data, such as the respondent demographics were recoded with a numerical value (e.g.: NZIQS member = “1”, not NZIQS member = “2”). Ordinal data with rating scales that included “0” or negative rating points were recoded with the lowest rating point starting at “1”. Missing values or “I don’t know” responses were left blank as missing values. Ordinal data was not transformed into interval data as non-parametric statistical techniques do not require data to be in interval format (Laerd Statistics, 2020). The table below showing the rescaling of ‘importance’ data is provided for illustration:

Table 6: Recoding of Performance Data for Statistical Analysis

| Original Rating | Interpretation | Recoded Rating | Revised Interpretation |
|-----------------|--------------------------|----------------|--------------------------|
| 0 | no importance | 1 | no importance |
| 1 | minimum importance | 2 | minimum importance |
| 2 | below average importance | 3 | below average importance |
| 3 | average importance | 4 | average importance |
| 4 | above average importance | 5 | above average importance |
| 5 | maximum importance | 6 | maximum importance |
| don't know | don't know | | blank |
| | skipped | | blank |

A further category of data was created using the responses to the External Force Impact questions of the questionnaire which asked respondents to rate the Impact of External Forces on a QS organisation on a scale from “-3” (large threat) to “+3” (large opportunity) with “0” as the neutral midpoint (no impact, neither threat nor opportunity). These responses were copied to create an additional category and recoded to provide ‘depolarised’ impact ratings. The reason for the introduction of this category is that it was thought that there would be more consensus among respondents regarding the magnitude (size) of an External Force impact, than there would be regarding it’s direction (threat vs opportunity).

For an example taken from the literature:

- There is widespread agreement that BIM and IT are set to inflict far reaching change, however,
- There is disagreement as to whether that change brought about by BIM and IT advances will be positive or negative.

The recoding key is given in the table below.

Table 7: Recoding of Additional ‘Depolarised’ Impact Rating Data

| Original Rating | Interpretation | Recoded Rating | Revised Interpretation |
|-----------------|--------------------|----------------|------------------------|
| -3 | large threat | 4 | large impact |
| -2 | medium threat | 3 | medium impact |
| -1 | small threat | 2 | small impact |
| 0 | neutral/no impact | 1 | no impact |
| 1 | small opportunity | 2 | small impact |
| 2 | medium opportunity | 3 | medium impact |
| 3 | large opportunity | 4 | large impact |
| don't know | don't know | | missing data |
| | missing data | | missing data |

Hypothesis testing required that comparisons could be drawn between ‘emerging’ and ‘highly experienced’ respondents. The years of experience data was recoded as follows to create those two categories:

Table 8: Recoding of Primary Demographics Groups - Emerging and Highly Experienced

| Original Rating | Interpretation | Recoded Rating | Revised Interpretation |
|------------------|------------------|----------------|------------------------|
| 0-5 years | 0-5 years | 1 | emerging |
| 6-10 years | 6-10 years | 1 | emerging |
| 11-15 years | 11-15 years | 2 | highly experienced |
| 16-20 years | 16-20 years | 2 | highly experienced |
| 21 years or more | 21 years or more | 2 | highly experienced |
| | skipped | | skipped |

Hypothesis testing also required that comparisons could be drawn between ‘consultant QS’ and ‘other’ groups. The organisation demographics data was recoded as follows to create those two categories:

Table 9: Recoding of Primary Demographics Groups - Consultant QS and Other

| Original Rating | Interpretation | Recoded Rating | Revised Interpretation |
|---|---|----------------|------------------------|
| construction cost management consultancy | construction cost management consultancy | 1 | consultant QS |
| diversified property services consultancy | diversified property services consultancy | 2 | other |
| construction contractor or subcontractor | construction contractor or subcontractor | 2 | other |
| client organisation | client organisation | 2 | other |
| bank or financier | bank or financier | 2 | other |
| government (local/state/national) | government (local/state/national) | 2 | other |
| education provider | education provider | 2 | other |
| other (please specify) | other (please specify) | 2 | other |
| | skipped | | skipped |

3.6.2.3 *Outlier identification and removal*

First, a visual inspection of the prepared data was undertaken to identify any possible non-genuine responses. This visual scan highlighted the responses given by respondent ID #21 as abnormal due to long streaks of same repeated response rating (e.g., 6, 6, 6, 6, 6, 6, 6, etc.) which was inconsistent with the response ratings of other respondents which visually appeared to be in a much more random order.

Secondly, outliers were statistically identified using SPSS. SPSS displays two degrees of outliers on the boxplot. Firstly, ‘outliers’, denoted on the boxplot with a “o” are defined as a value between 1.5 and 3 times the interquartile range (IQR) from the end of a box. The IQR is the difference between the 25th and 75th percentiles and is represented by the length of the ‘box’ in the boxplot. Secondly, ‘extreme values’, denoted with an “*” are defined as values that more than 3 IQR’s from the end of a box (IBM, 2019). To avoid excessive erosion of the data, the maximum amount of outliers to be removed was set at 5%.

3.6.2.4 *Normality checks*

Testing data for normal distribution is an essential step in determining the type of statistical techniques that can be used. There are two main approaches to assessing the normality of data; graphical and statistical. Graphical tests were developed to avoid the need for complex calculations. A simple test is a visual check of a histogram of the data values for normal distribution. Another approach is the normal probability plot where the straight line of a cumulative normal distribution is compared with the cumulative distribution of the actual data. While these graphical techniques can provide a richer picture of the data, they are criticised for their lack of precision and objectivity. It is not recommended that graphical techniques are relied on without statistical tests. Two of the most common statistical tests are the Kolmogorov–Smirnov and the Shapiro-Wilks tests, both of which compute the level of significance for the variance from normal distribution (Hair, Black, Babin, & Anderson, 2019). Both tests for normality were carried out using SPSS, after removal of outliers.

Normality checks were carried out on the original and follow-up observation data. Normality checks were not carried out on the case study data – sample sizes were significantly smaller (i.e.: 5 cases) than in the descriptive survey stage so it was determined that non-parametric techniques should be applied in line with generally accepted practice (Altman, Gore, Gardner, & Pocock, 1983; Morgan, 2017).

3.6.2.5 *Descriptive statistics*

Simple descriptive statistics such as calculations of means, counts and rank order were undertaken in SPSS.

3.6.2.6 *Inferential statistics*

Two main inferential statistics tests were required for the analysis of the data. As the data does not feature a normal distribution (the results of the normality checks are described in the relevant section of the Descriptive Research Results chapter) – non-parametric techniques were selected. Tests were required for two main purposes:

1. Strength of relationship between two variables

Due to the number of possible combinations of Internal and External Factors (728), it was not practicable to require questionnaire respondents to quantify the strength of these relationships. Spearman's Rank Correlation Coefficient (SRCC) was selected to analyse these relationships. SRCC is one of the most commonly used in business and management research; it assesses the strength of the relationship between two variables of ranked order data (Saunders et al., 2016). SRCC was the appropriate choice because the data is not normally distributed, the variables are measured in an ordinal scale, and the variables are paired observations – meaning each paired observation of Internal and External Factors is the rating given to each variable by a single respondent (Laerd Statistics, 2020). 'Two-tailed' was selected as the Test of Significance in SPSS and the alpha level for significance was set by default at 0.050 (unless specifically stated otherwise).

Multiple regression analysis is the next step up from correlation analysis. Due to the data characteristics (ordinal data, non-normal distribution, presence of outliers, etc) regression analysis was considered less suitable. Multiple regression analysis trials were undertaken to test the suitability of the method, but the results yielded were less useful than the results obtained from the more robust SRCC approach, so this approach was not continued.

2. Difference between two groups

The Mann-Whitney U test can be used to determine whether the difference between two independent groups is statistically significant (Kolassa, 2020). The Mann-Whitney U test is the appropriate statistic because the data is not normally distributed, the independent variables comprise two independent categories of respondents (such as NZIQS members and non-NZIQS members), and there is independence of observations – meaning participants do not appear in more than one group (Laerd Statistics, 2020). ‘Exclude cases test-by-test’ was selected for Missing Values in SPSS and the alpha level for significance was set at 0.050.

3.6.2.7 Rescaling for Meaningful Interpretation

Following statistical analysis using inferential statistics, results were rescaled for meaningful interpretation. Statistics measuring variables that were considered purely on a single positive scale (such as performance scores which ranged from ‘0’ to had

3.7 Techniques Applied to the Hypotheses Tests

3.7.1 Test of Hypothesis 1

Hypothesis 1 tests whether perceptions of Internal Factor importance and External Factor impact change over time. The Mann-Whitney U test will be used determine whether the difference in perceptions of Internal Factor importance and External Factor impact between the two independent groups (original observation and follow-up observation) is statistically significant. The predefined alpha is set for 0.05.

3.7.2 Test of Hypothesis 2

Hypothesis 2 tests whether perceptions of Internal factor importance and External Factor impact are culturally specific. The perceptions of NZIQS and non-NZIQS respondents will be compared in this test. The Mann-Whitney U test will be used determine whether the difference in perceptions of Internal factor importance and External Factor impact between the two independent groups (NZIQS and non-NZIQS) is statistically significant. The predefined alpha is set for 0.05.

3.7.3 Test of Hypothesis 3

Hypothesis 3 tests whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders. The perceptions of Consultant QS and 'other' respondents will be compared in this test. The Mann-Whitney U test will be used determine whether the difference in perceptions of Internal factor importance and External Factor impact between the two independent groups (Consultant QS's and others) is statistically significant. The predefined alpha is set for 0.05.

3.7.4 Test of Hypothesis 4

Hypothesis 4 tests whether perceptions of Internal factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with for carrying it out. The perceptions of 'Highly Senior' and 'Emerging' respondents will be compared in this test. The Mann-Whitney U test will be used determine whether the difference in perceptions of Internal factor importance and External Factor impact between the two independent groups (Highly Senior and Emerging) is statistically significant. The predefined alpha is set for 0.05.

3.7.5 Test of Hypothesis 5

Hypothesis 5 tests whether a relationship exists between the perceived impact of External Factors and perceived importance of Internal Factors. The ‘impact of External Factors’ is the independent variable, and ‘importance of Internal Factors’ is the dependent variable. Spearman’s Rank Correlation Coefficient will be used to assesses the strength of the relationship between two variables of rank ordered data. The predefined alpha is set for 0.05.

3.7.6 Test of Hypothesis 6

Hypothesis 6 tests whether the total correlation scores per Internal Factor remain constant over time. The two independent points in time of the original and follow-up observations are the independent variables, the dependent variable is the rank order of the Internal Factors’ total correlation scores. Perfectly matched pairs between both sets of data will be the test for the hypothesis.

3.7.7 Test of Hypothesis 7

Hypothesis 7 tests whether the ranking in Internal Factors in the ‘perceived importance-based’ model matches the ranking in the ‘External Force-matched’ model. Perfectly matched pairs between both sets of ranked data will be the test for the hypothesis.

3.7.8 Test of Hypothesis 8

Hypothesis 8 tests whether QS firms’ relative levels of performance of Internal Factors matches the order of importance of those Factors based on the ‘perceived importance-based’ model. Perfectly matched pairs between both sets of ranked data will be the test for the hypothesis.

3.7.9 Test of Hypothesis 9

Hypothesis 9 tests whether QS firms' relative levels of performance of Internal Factors matches the order of importance of those Factors based on the 'External Force-matched' model. Perfectly matched pairs between both sets of ranked data will be the test for the hypothesis.

3.7.10 Test of Hypothesis 10

Hypothesis 10 tests whether there is a positive correlation between firms' relative levels of modelled 'health' (as modelled using the 'perceived importance-based' model) and 'success'. The 'relative levels of modelled health' is the independent variable, and 'success' is the dependent variable. Spearman's Rank Correlation Coefficient will be used to assesses the strength of the relationship between two variables of rank ordered data. As the purpose of this evaluative tests is check the validity of the developed model in small case study settings (small sample size, $n=5$), the predefined alpha is set for 0.10.

3.7.11 Test of Hypothesis 11

Hypothesis 11 tests whether there is a positive correlation between firms' relative levels of modelled 'health' (as modelled using the 'External Force-matched' model) and 'success'. The 'relative levels of modelled health' is the independent variable, and 'success' is the dependent variable. Spearman's Rank Correlation Coefficient will be used to assesses the strength of the relationship between two variables of rank ordered data. As above, the predefined alpha is set for 0.10.

3.7.12 Test of Hypothesis 12

Hypothesis 12 tests whether there is a closer relationship between the ‘External Force-matched’ model (*H2*) level of ‘strategic health’ and success than between the ‘perceived importance-based’ model (*H1*) level of ‘health’ and success. The presence of a variance between the results for the tests for Hypotheses 10 and 11 will be the test for this hypothesis.

3.8 Reliability and Validity

Reliability and validity are two elements of research quality that must be considered in tandem. For instance, requiring the results of in depth semi structured interviews to be repeatable would not be reasonable and would in-fact undermine their value, underpinned by a flexibility of the approach which allows exploration of themes in all their complexity. Whilst from a purely quantitative perspective, semi-structured interviews might be considered unreliable, their inclusion serves to improve the validity of the overall study (Saunders et al., 2016).

The steps taken to ensure a good quality research results in this study are discussed under the heading of validity and reliability below.

3.8.1 Validity

Where possible, measurement validity was achieved through checking of data with respondents (interview transcript sign-off), discussing questionnaire design with supervision team, and pre-testing the questionnaires with industry. These steps allowed research stakeholders to correct and validate the measurement instruments.

Triangulation – involving more than one source of data – is a recommended approach to improve validity (Saunders et al., 2016). Methodological triangulation was achieved through the multi-stage mixed methods research design using secondary literature sources, qualitative in depth semi structured interviews, quantitative descriptive surveys undertaken in two stages (repeated), and finally, evaluative case study surveys.

3.8.2 Reliability

Clear documentation of approaches to the various stages of the study was the main step taken to uphold the reliability of the data gathered. All key correspondence with participants was through written means to allow future or third-party interrogation of assumptions and key messages. Repetition of the original observation survey with a follow up observation seven years later goes some way to demonstrating the repeatability of the core quantitative stage of the study.

Cronbach's Alpha is a coefficient used to measure the consistency of responses across a number of questions to determine whether or not they are measuring the same underlying variable. The statistic provides an Alpha With values between zero and one an Alpha greater than 0.7 indicates the questions in the scale are measuring the same variable. Cronbach's Alpha will be applied to the responses to the questions on firms' levels of relative success (in the evaluative research surveys), in order to test the reliability of the success measures applied.

3.9 Research Ethics

Research ethics is a critical component of a good study design (Saunders et al., 2016). All stages of this study were assessed for risk of harm and included supervisor peer review of those assessments. The steps taken to review the potential for harm arising from the research were:

1. Review of the Code of Ethical Conduct for Research, Teaching and Evaluations Involving Human Participants, especially as it related to measures to minimise potential harm to participants, the researcher and the University.
2. Discussion with supervision team of the potential ethical issues present when accessing information from within private organisations (particularly commercially sensitive information) and how these should be dealt with or avoided in the research questions. As a result of these discussions it was decided to exclude questions that would require respondents to comment directly on hard measures of financial performance of individual firms.
3. Supervisory team and industry peer reviewer review of questionnaire document (including information sheets and ethics notes).
4. Completion of Massey University Human Ethics Committee (MUHEC) screening checklists and risk matrices to determine the study's risk profile in regard to potential for harm.

Following these steps, for each stage of the study, it was concluded that the nature of any possible harm to participants, if any, would be minimal and “no more than is normally encountered in daily life”; as such Low Risk Notifications were lodged.

Despite the research being ‘low’ risk, a number of key ethical issues were considered, and appropriate mitigating strategies put in place:

1. Ethics notification: firstly, research participants were made aware at all stages that the research had been judged low risk by the research team and therefore had not had formal Human Ethics Committee review or approval. Notifications were included in research information sheets with ethics committee contact information should respondents have concerns they would like to discuss with someone outside the research team:

"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact [...], Director (Research Ethics), email humanethics@massey.ac.nz."

No known concerns were lodged with the Human Ethics Committee.

2. The cost of participation: in this instance it is non-financial; it is the time commitment of respondents in completing the questionnaire. To minimise and make this as convenient as possible, the questionnaires were conducted using web-based survey platforms to enable respondents to complete the questionnaire at a time and place most convenient to themselves. Questionnaires were kept as brief as possible to limit the time taken to complete. They were also pre-tested to ensure questionnaire usability.
3. Voluntary participation and consent: statements will be included in the opening sections of the questionnaire outlining the aims of the research (what the data will be used for), that participants have the right to not answer any question or withdraw from the study at any time and their identity will be kept anonymous.

4. Incentives: In order to maximise the benefit of the research to the study population (by achieving more statistically robust research), a small incentive (chance to win one of three \$150 gift cards) was offered to the follow-up observation survey population. As there is not considered to be any greater risk to participants than normally encountered in everyday life (absence of harm) this wasn't thought to alter the risk profile of the study. The incentive was set to indicate a level of commitment from the research team to take reasonable steps to maximise the response rate, without offering incentives so great that they would generate responses from otherwise unwilling respondents and thereby jeopardise the results of the study.
5. Balancing the burdens and benefits of the research to the target population: overall, throughout all stages of the research, consideration was given to the burden of participation placed on the target population. The cumulative time donated to the research through the exploratory interviews, the two stages of survey, and the evaluative case studies is not insignificant; so, consideration was given for balancing this with expected levels of data reliability and validity. An example of this is the number of case study firms selected (five rather than say 20).
6. Informed consent: for the interview and case study stages, information sheets were provided, and participant consent forms administered prior to commencing data gathering. For the descriptive surveys, respondents were advised that consent was implied through completion of the questionnaire.
7. Privacy, anonymity and data security: all data has been stored only in encrypted, password-protected cloud-based platforms (Dropbox, SurveyMonkey and Qualtrics). No data is saved on personal computers.

3.10 Chapter Summary

The chapter provided an outline of the approaches and techniques applied in the gathering and analysis of the data to address the research aims and objectives.

Epistemologically, this study takes a positivist stance, with an emphasis on the discovery of observable and measurable phenomena (i.e.: Factors). In terms of theory development, an abductive approach is taken.

The multi-stages of the mixed methods research design were outlined:

- Exploratory research: qualitative in-depth semi-structured interviews;
- Descriptive research: two rounds of descriptive survey questionnaires, and;
- Evaluative research: case study testing of the developed model.

The hypotheses proposed to address the research objectives were stated and the a-priori tests for each were described.

Ethical concerns and considerations of reliability and validity were outlined and the mitigating strategies to minimise the potential for any harm to participants and to the maximise the validity and reliability of the data were described.

4.0 EXPLORATORY RESEARCH RESULTS

4.1 Chapter Introduction

This chapter presents the results of the semi-structured in-depth interviews that were undertaken to respond to the second of the research aims which is to identify what the key Internal and External Factors are for QS firms to consider during strategic planning.

Specifically, this chapter addresses objectives 1(a) to (c) by:

- a. identifying the key Internal Factors that should be considered in QS firms' strategic planning process;
- b. identifying the key External Factors that should be considered in QS firms' strategic, and;
- c. establishing how QS firms measure success.

The factors identified in this chapter will be operationalised and tested in the descriptive survey stage (Chapter 5.0) and utilized for the development of the research model (Chapter 6.0).

4.2 Respondent Demographics

The population of interest to the overall research study is the Australasian consultant quantity surveying community. As a main purpose of this stage was to define the constructs which would be tested in the later research phases, it was considered that key persons in significant leadership roles with the prerogative of taking a 'birds eye view' would be the most appropriate subset of the population for participation in this study stage.

As outlined in the Research Methods chapter, the framework developed as an output of the exploratory interviews in 2010 was reviewed by pre-testing of the first (2013) and follow-up (2020) questionnaires.

The respondents for both the exploratory interviews and the developed framework reviews, were all key leaders drawn from a range of Australasian QS firms, professional institutes, and academic institutions. No respondents participated in more than one of the below phases.

4.2.1 Exploratory Interview

The below table of respondent attributes demonstrates a very senior and experienced sample. 12 of the respondent's held senior leadership roles with a professional quantity surveying firm, one was a leading academic and the remaining two were directors of professional quantity surveying institutes. The average number of years of relevant experience (excluding the two institute directors) of the respondents was just over 30.

Interviews were conducted in November and December of 2010.

Table 10: Exploratory Interview Respondent Demographics

| Demographic variable | Interviewee ID# | | | | | | | | | | | | | | | Count |
|---|-----------------|------|------|------|------|------|------|------|------|-----|------|-----|------|------|------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
| QS firm - international | * | * | * | | * | | | * | | | | | | * | * | 7 |
| QS firm - local | | | | * | | * | * | | * | | | | * | | | 5 |
| University | | | | | | | | | | | * | | | | | 1 |
| QS institute | | | | | | | | | | * | | * | | | | 2 |
| Australia | | | | | * | * | * | * | * | | * | * | * | * | * | 10 |
| NZ | * | * | * | * | | | | | | * | | | | | | 5 |
| Director/Associate Director | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | 14 |
| QS Institute National/Regional President (past/present) | | | | * | | | * | | * | | | | * | * | * | 6 |
| Professor (past/present) | | | | | | | | | * | | * | | | | | 2 |
| Years' experience | > 20 | > 20 | > 30 | > 30 | > 30 | > 20 | > 20 | > 30 | > 40 | n/a | > 20 | n/a | > 30 | > 40 | > 10 | - |

4.2.2 2013 Framework Review (first observation questionnaire pre-test)

The pre-testers for the first observation survey comprised four directors of QS firms – all highly experienced individuals with over 30 years' experience. Three had served as presidents of their respective QS institute.

Table 11: 2013 Framework Review Respondent Demographics

| Demographic variable | Reviewer ID# | | | | Count |
|---|--------------|-----|-----|-----|-------|
| | #1 | #2 | #3 | #4 | |
| QS firm - international | | * | | | 1 |
| QS firm - local | | | * | * | 2 |
| University | * | | | | 1 |
| QS institute | | | | | - |
| Australia/New Zealand | * | * | * | * | 4 |
| Director/Associate Director | | | * | * | 2 |
| QS Institute National/Regional President (past/present) | | * | * | * | 3 |
| Professor (past/present) | | | | | - |
| Years' experience | >30 | >30 | >30 | >30 | - |

4.2.3 2020 Framework Review

The pre-testers for the follow-up survey comprised five respondents, three were senior level practicing quantity surveyors and two were academics. Industry experienced ranged from over 10 to over 30 years.

Table 12: 2020 Framework Review Respondent Demographics

| Demographic variable | Respondent ID# | | | | | Count |
|---|----------------|----|----|----|----|-------|
| | #1 | #2 | #3 | #4 | #5 | |
| QS firm - international | * | | * | | | 2 |
| QS firm - local | | | | * | | 1 |
| University | | * | | | * | 1 |
| QS institute | | | | | | - |
| Australia/New Zealand | * | * | * | * | * | 5 |
| Director/Associate Director | | | * | * | | 2 |
| QS Institute National/Regional President (past/present) | | | | | | - |

| | | | | | | |
|--------------------------|-----|-----|-----|-----|-----|---|
| Professor (past/present) | | | | | * | 1 |
| Years' experience | >10 | >20 | >20 | >30 | >30 | - |

4.3 Situation Analysis External Factors (Forces)

The External Factors articulated below are the result of the analysis of the exploratory interviews and the proposed framework review undertaken in preparation for the first descriptive round in 2013. The framework was reviewed again as pre-testing for the follow-up observation in 2020. In the few instances where this follow-up stage review caused the wording of any of the factors to be altered, then both the original and refreshed framework revisions are presented.

The Factors are presented in groupings for ease of understanding. Each factor is presented as a short description followed by summaries of the relevant underpinning interview data. As outlined in section 3.5.2.1 of the research methods chapter these descriptions are those that were operationalised for testing in the descriptive survey questionnaires.

4.3.1 Outside Forces

The External Factors that originate from, or exist, 'outside' the of the traditional or existing QS environment have been included under the 'Outside Forces' grouping.

Overall, respondents saw a general threat to the full package of services traditionally offered by quantity surveyors being eroded by other professions [Resp. 1 / Resp. 6]. At the same time, they saw this blurring of professional boundaries [Resp. 14] as an opportunity to grow their service base and move into other fields [Resp. 3 / Resp. 4 / Resp. 6 / Resp. 15].

Respondents overwhelmingly stated the view that quantity surveyors needed to take advantage of this blurring of boundaries to diversify their service offering [Resp. 1 / Resp. 2 / Resp. 3 / Resp. 5 / Resp.

7 / Resp. 8 / Resp. 11]. One respondent noted that to remain a ‘pure’ quantity surveying firm is a precarious position [Resp. 10]. Others however, also highlighted the pitfalls of diversification, chiefly that the loss of focus could cause a watering down of professional quantity surveying practice [Resp. 6] and a dilution of quantity surveyors’ influence within organisations [Resp. 12].

4.3.1.1 Associated professions

External Factor description:

Blurring boundaries with associated construction services (such engineers or project/facilities/asset managers)

Exploratory interview data:

The effect of the blurring boundaries or ‘fuzzying’ of professions [Resp. 14] with associated construction industry service providers was seen as both positive and negative.

Incursions into the quantity surveying field were seen as a threat, and these were identified as coming from a number of sources:

- Engineering firms [Resp. 9 / Resp. 10 / Resp. 12]
- Project managers [Resp. 2 / Resp. 6 / Resp. 8]
- Facilities managers [Resp. 1]
- Property consultants including real estate and valuation firms [Resp. 1 / Resp. 2 / Resp. 15]

On the other hand, this blurring also poses an opportunity for quantity surveying skills transferable to associated parts of the construction industry. Examples included:

- Providing earlier development stage advice such as overall development budgets and feasibilities [Resp. 3 / Resp. 6 / Resp. 9 / Resp. 11].
- Project management services including project planning and programming [Resp. 1 / Resp. 2 / Resp. 3 / Resp. 7]
- Facilities and asset management services including builder's reports and maintenance reports [Resp. 1 / Resp. 6 / Resp. 7 / Resp. 9 / Resp. 10 / Resp. 11]. One respondent noted however that fees were generally lower than what could be charged for quantity surveying [Resp. 3].
- Quasi-legal services including contract advice [Resp. 7] and dispute resolution services [Resp. 10].
- In general, anything in the periphery or fringes of what is currently offered [Resp. 1 / Resp. 7] including tax advice, sinking funds, [Resp. 7], specifications writing and property valuation [Resp. 1].

4.3.1.2 *Non-construction professions*

External Factor description:

'Blurring market boundaries with non-construction professionals (lawyers, accountants, management consultants, financial services providers)' – the original description *'The blurring market boundaries with non-construction professionals (lawyers, accountants, management consultants)'* was revised to include 'financial service providers' following second round reviewers' feedback.

Exploratory interview data:

Again, this trend was regarded as both positive and negative. As a threat the main source of competition from non-construction professionals was accountants [Resp. 5 / Resp. 9 / Resp. 10 / Resp. 12 / Resp. 13 / Resp. 15] and management consultants [Resp. 9 / Resp. 10 / Resp. 15].

On the flipside, respondents saw opportunities to grab back market share by offering management consulting type services within the built environment. Commonly cited were master planning services at government advisory level for large social infrastructure projects [Resp. 9 / Resp. 10 / Resp. 12 / Resp. 14 / Resp. 15]. Specific examples included cost analysis of the health care systems and hospitals [Resp. 9 / Resp. 14 / Resp. 15].

4.3.1.3 Non-building

External Factor description:

Demand from the non-building sectors of the construction industry (such as construction of mining, energy or transport infrastructure)

Exploratory interview data:

- Mining [Resp. 7 / Resp. 9 / Resp. 12 / Resp. 13 / Resp. 15]
- Oil and gas sectors [Resp. 10].
- Civil construction [Resp. 6 / Resp. 7 / Resp. 10]
- Infrastructure [Resp. 2 / Resp. 3 / Resp. 6 / Resp. 7 / Resp. 9 / Resp. 10 / Resp. 12 / Resp. 15]. Specific examples include transport infrastructure [Resp. 9] and rail [Resp. 7].
- One respondent noted however, that incumbent engineers pose a barrier to quantity surveyors realising these opportunities and would need to be displaced [Resp. 13].

4.3.1.4 Other industries

External Factor description:

Demand from other industries (e.g.: manufacturing, events, healthcare, or disaster relief)

Exploratory interview data:

Respondents referred to opportunities for offering services even outside of the construction industry [Resp. 4 / Resp. 7 / Resp. 9 / Resp. 14 / Resp. 15]. Some specific examples include:

- Cost control in production and manufacturing (process engineering) [Resp. 7 / Resp. 9 / Resp. 14].
- Generic business administration and financial management advisory services [Resp. 7 / Resp. 9].
- Cost control in international aid spending [Resp. 7].
- Terrorism and personal and security cost advice [Resp. 9 / Resp. 12].

4.3.1.5 Environmental services

External Factor description:

Demand for emerging environmental services (e.g.: carbon accounting, environmental economics, sustainability audits)

Exploratory interview data:

Climate change [Resp. 11] and the associated awareness of environmental issues [Resp. 12] coupled with the transferability of QS skills have created opportunities for provision of new services. Specific examples cited include:

- Environmental economics [Resp. 11] including embodied energy/carbon accounting [Resp. 7 / Resp. 10 / Resp. 11 / Resp. 12 / Resp. 15] as well as building energy use [Resp. 11] and interior environment [Resp. 10].
- Opportunity Services associated with green building and environmentally sustainable design [Resp. 6 / Resp. 7 / Resp. 10 / Resp. 14 / Resp. 15] including specifically Greenstar and NABERS services [Resp. 15].

4.3.1.6 Barriers to entry

External Factor description:

The barriers to entry for new competitors (such as professional registration, requisite knowledge, technology etc.)

Exploratory interview data:

- Respondents lamented the lack of enforceable registration and certification schemes in some jurisdictions [Resp. 1 / Resp. 9 / Resp. 11 / Resp. 12 / Resp. 14 / Resp. 15].
- The effect of this is that the threshold for new entrants is set relatively low [Resp. 9 / Resp. 15].
- One respondent noted that any change would likely need to be government led [Resp. 1].
- Lower cost markets (globally) capable of handling the more process-oriented aspects could be both a threat [Resp. 14] and opportunity [Resp. 15]

4.3.2 Substitute Forces

External Factors in this category are those that have the potential to replace all or part of the services currently provided by quantity surveyors.

4.3.2.1 *IT substitutions*

External Factor description:

IT advances with the potential to replace some of the more process-oriented aspects of QS work

Exploratory interview data:

- Certain advances in technology (CAD and BIM) have the potential to render some of the more process-oriented aspects of quantity surveying redundant [Resp. 8 / Resp. 12 / Resp. 14 / Resp. 15].
- This is particularly concerning if quantity surveyors stand on the side-lines [Resp. 10].

4.3.2.2 *Non-traditional procurement*

External Factor description:

'Construction contracts or procurement approaches that require less QS involvement (e.g. turnkey design & build)' – the original description 'Construction procurement options that may not require a traditional independent QS function (design-build or turnkey contracts)' was slightly reworded in response to second round reviewers' feedback.

Exploratory interview data:

Respondents highlighted the threat of procurement methods that demand only a reduced role for an independent cost advisor [Resp. 10 / Resp. 12 / Resp. 15]. Examples included:

- Public Private Partnerships which were typically led by industry consortia of risk and equity stakeholders. Whilst this model still requires a cost advisor, it was thought to be a lesser role than in traditional procurement [Resp. 2 / Resp. 3 / Resp. 15].
- Turnkey and Design & Build projects where a main contractor acts as a one-stop-shop [Resp. 2 / Resp. 6].
- Main contractors offering budgeting and cost planning services at no cost as a means to secure a project [Resp. 8 / Resp. 15].
- Turnkey solutions from international competitors (such as Chinese firms), which of course include offshore consultants [Resp. 14].

4.3.2.3 *Lead consultants*

External Factor description:

Lead consultants (architects or project managers) who manage projects (in whole or in part) without independent QS involvement

Exploratory interview data:

Dependence on Architects and Project Managers for referrals for work, this is an issue when those professionals perceive quantity surveyors as a nuisance for uncovering the cost implications of design errors [Resp. 13]. In some cases, specialised professionals may have a detailed understanding of costs and not require a QS [Resp. 15].

4.3.2.4 In-house QS

External Factor description:

Developers and clients with their own cost management resources

Exploratory interview data:

- Vertically integrated developers and specialist clients that succeed with in-house cost control [Resp. 3 / Resp. 6 / Resp. 12 / Resp. 13 / Resp. 15].

4.3.2.5 Public cost data

External Factor description:

Publicly available construction cost data

Exploratory interview data:

- New and existing avenues of brokering information such as cost guide publications [Resp. 1 / Resp. 15]

4.3.3 Supply Side Forces

‘Supply Side’ External Factors are those that feed into QS firms, which firms are dependent on and cannot control.

4.3.3.1 *Qualifications*

External Factor description:

The style and quality of QS qualifications offered by tertiary education institutions

Exploratory interview data:

- General concerns with the quality of formal education [Resp. 6 / Resp. 7 / Resp. 8].
- A perceived ‘dumbing down’ of quantity surveying education [Resp. 2 / Resp. 6 / Resp. 12] where graduates may be ‘well rounded’ but lack the ‘core skills’ [Resp. 1 / Resp. 2].
- Tertiary education institutes not working closely enough with industry to ensure courses meet needs [Resp. 9 / Resp. 12].
- Some qualifications are too ‘desk and book’ based [Resp. 10], sandwich degrees, offering workplace integrated learning are an opportunity [Resp. 1].

4.3.3.2 *Employment market*

External Factor description:

The availability of suitably skilled, qualified and experienced practitioners

Exploratory interview data:

- The aging workforce [Resp. 1 / Resp. 7 / Resp. 13] and the emerging ‘gap in the middle’ [Resp. 13].
- A relatively small talent pool meaning companies were often forced to settle for lower than desired staff quality and skill levels [Resp. 1 / Resp. 2 / Resp. 6 / Resp. 13 / Resp. 15].

- The difficulty attracting and retaining good staff in general [Resp. 11 / Resp. 13 / Resp. 15].
- The difficulty attracting the younger generation due to the profession's lack of appeal [Resp. 1 / Resp. 8 / Resp. 13] and disparity with new entrants' salary expectations [Resp. 1].
- The difficulty scaling up in times of booms in the construction industry [Resp. 10].
- Opportunity for staff recruitment included the ability to offer people international mobility in some cases [Resp. 14], the prospect of a generally well-paid profession and the ability to therefore pay good salaries [Resp. 11] as well as the ability to recruit from off shore (particularly the UK) [Resp. 1].

4.3.3.3 IT advances

External Factor description:

IT advances that promise more efficient ways of working (such as Building Information Modelling)

Exploratory interview data:

Certain advances in information technology that promise more efficient working, particularly cost and building information management software [Resp. 1 / Resp. 7 / Resp. 10 / Resp. 13 / Resp. 15].

4.3.3.4 Upstream information

External Factor description:

'The quality of design and information produced by other consultants (designers, project managers, etc)' – the original description 'QS dependence on commissions and information from upstream service providers (such

as architects or project managers)' was revised following second round reviewers' feedback to focus on 'information' rather than 'commissions' (upstream commissions are addressed under the 'Supply Chain Position Force', refer to section 4.3.4.6).

Exploratory interview data:

- Dependent on upstream designers to be able to leverage efficiencies in cost management software [Resp. 1] so poor documentation from designers is a threat [Resp. 3]. The quality of design if fast tracked can be a problem for QSs to cope with [Resp. 15]
- Quantity surveyors' commissions are traditionally through Architects [Resp. 3].

4.3.4 Demand Side Forces

These 'Demand Side' Forces are those External Factors that generate demand for quantity surveying services.

4.3.4.1 Industry cycles

External Factor description:

Fluctuations in demand due to the cyclical nature of the construction industry

Exploratory interview data:

- Threat of reduced capital expenditure in times of downturn [Resp. 11], no work obviously means no fees [Resp. 13] as competition amongst existing competitors increases.
- On the other hand the post-GFC economic climate generated a focus on tighter cost control with cost management opportunities due to budget focused clients [Resp. 4], banks and

financial institutions are more cost conscious [Resp. 12], and an increased focus on probity [Resp. 6].

- Seek out opportunities for countercyclical services in times of downturn [Resp. 7].

4.3.4.2 Private sector

External Factor description:

The current level of recognition of - and demand for - QS services from private sector clients

Exploratory interview data:

- Client's limited perception or understanding of what quantity surveyor's offer [Resp. 1 / Resp. 6].
- Clients that don't realise they require the services of a quantity surveyor or see it as an optional extra [Resp. 13].
- The threat of 'doubters' [Resp. 8].
- Others noted that top tier building clients and developers were well aware of QSs and their value [Resp. 15].

4.3.4.3 Public sector

External Factor description:

The current level of recognition of - and demand for - QS services from government / public sector

Exploratory interview data:

The political fallout of any cost overruns in major capital works projects and programmes drives the involvement of quantity surveyors in the public sector [Resp. 12 / Resp. 15]. There is, nevertheless, a sentiment of a 'lack of recognition' for quantity surveyors in the public sector [Resp. 12] and a view that legislative changes [regulations for tax depreciation schedules for example] tend to undermine rather than underpin the position of the quantity surveyor [Resp. 13].

4.3.4.4 *Associated professionals*

External Factor description:

The current level of recognition of - and demand for - QS services from associated professions (architects / project managers)

Exploratory interview data:

Close relationships with upstream members of the supply chain, such as architects, are important [Resp. 1]. Unfortunately, there is thought to be a lack of recognition from other professions [Resp. 12], particularly those that have the ear of the client [Resp. 10], for the skills brought to a project by quantity surveyors.

4.3.4.5 *Contractor demand*

External Factor description:

The current level of recognition of - and demand for - QS services from building contractors (and subcontractors)

Exploratory interview data:

Generally, respondents agreed that looking ‘upstream’ was the priority, however, there was also demand for measuring and estimating services from contractors and subcontractors [Resp. 08]

4.3.4.6 Supply chain position

External Factor description:

The quantity surveyor's typical position on the construction supply chain (proximity to client)

Exploratory interview data:

The aspiration is to be directly engaged as the client’s representative.

- The quantity surveyor’s traditional position on the construction supply chain may be too far down the ‘chain of command’ [Resp. 6].
- Quantity surveyors may be able to leverage the importance of ‘cost’ to move up the supply chain and reposition themselves to report directly and independently to the client as first or second consultant appointed [Resp. 3 / Resp. 7 / Resp. 13].

4.3.4.7 International demand

External Factor description:

International demand for local QS service providers (particularly from other regions experiencing stronger economic growth) – the original description ‘*International demand for local QS service providers (particularly from the Asia-Pacific region)*’ was revised following second round reviewer feedback who pointed to growth regions outside of Asia-Pacific that were impacting the local market.

Exploratory interview data:

Many respondents saw opportunities in offshore markets:

- offshore work through globalisation and the global market [Resp. 1].
- internationalisation [Resp. 11] and therefore the geographic diversification of market downturn risk [Resp. 12].
- the world order (global political, economic) [Resp. 7].

Specifically, respondents pointed to Asian markets:

- Asia-pacific market [Resp. 1].
- East Asia, china markets (globalization) [Resp. 9].

4.3.5 Inside Forces

‘Inside’ Forces, while external to the firm, are those External Factors that are internal to the profession – meaning the profession as a collective has some control or influence over these but individual firms do not.

4.3.5.1 Institute CPD

External Factor description:

The quality of continuing professional development (CPD) programs offered by QS institutes

Exploratory interview data:

Lifelong learning through CPD is important [Resp. 4]. Unfortunately, though, shortcomings in the formal CPD offered by QS institutes were identified [Resp. 9 / Resp. 15]; it should be better, more comprehensive, integrated and less piecemeal [Resp. 9].

4.3.5.2 Institute profile

External Factor description:

The quality of marketing and profile building initiatives by QS institutes

Exploratory interview data:

- There is currently a lack of institute profile [Resp. 10].
- There is an opportunity to increase our profile within the industry right up to representation at Government level [Resp. 1].
- Shared/collective promotion and improving the prominence of the national QS institute provides benefits for the entire profession [Resp. 1].
- Institute reputation is slowly on the rise [Resp. 13].
- Consider strategic alliances with other key groups such as property institutes [Resp. 1] or the RICS, which as a global brand has a level of critical mass [Resp. 9].
- Closer ANZ ties (between NZIQS and AIQS) could help to raise the collective profile whilst maintaining separate identities [Resp. 1].

4.3.5.3 Professional collaboration

External Factor description:

The current level of profession-wide collaboration on knowledge and data sharing and research

Exploratory interview data:

There could be more knowledge sharing within profession and attempts to standardise practice [Resp. 1]. Respondents noted the value that could be gained from non-publicly available cost and research databases or knowledge banks [Resp. 1 / Resp. 9 / Resp. 12 / Resp. 15] (like the old Australian National Public Works Bill of Quantities based format [Resp. 9]). Unfortunately, the profession was thought to lack the critical mass to justify shared databases of research and knowledge [Resp. 12] and firms were considered unlikely to share their intellectual property [Resp. 15].

4.3.5.4 Price competition

External Factor description:

The impact of QS practices which choose to compete on cost rather than quality (fee cutting)

Exploratory interview data:

- Undercutting [Resp. 7] or low cost ‘fee for service’ competitors who contribute to an undervaluing of QS services [Resp. 5].
- Under-cutters/fee cutters (although this can be self-destructive) [Resp. 3].
- Fee erosion through excessive competition [Resp. 1], although it is often only given a 30% weighting [Resp. 2].
- Lower cost business models, i.e. ‘one-man bands’ can be a threat to practices with a larger overhead [Resp. 10].

- Although undercutting firms, often don't keep up to date, and therefore risk extinction [Resp. 10].
- The problem can be exacerbated by clients that may not recognize the value of a QS, and therefore opt for lowest fee (huge threat to volume of work) [Resp. 13].
- More competition means fees go lower and the quality of work goes does [Resp. 15].

4.3.5.5 *Large firms*

External Factor description:

The increasing number and size of 'large' QS firms

Exploratory interview data:

- Mergers and takeovers of QS practices by larger firms (of accountants, development managers, engineers, project managers, lawyers) were regarded with suspicion, though respondents were often unsure if this was a threat or opportunity [Resp. 3 / Resp. 7 / Resp. 13 / Resp. 15].
- Larger firms – in whatever form could pose a threat to smaller firms that lacked the same brand and credibility [Resp. 13].

4.3.5.6 *Profession lifecycle*

External Factor description:

The current lifecycle stage of the traditional QS industry (growth or decline)

Exploratory interview data:

On one hand there was an observation that some aspects of the QS services offering are a 'mature service' in 'mature market' [Resp. 3]:

- Measuring and estimating is not well valued, takes a lot of time [Resp. 10].
- Demand for a Bill of Quantities is in demise [Resp. 8].

But others saw opportunity:

- It's all 'blue skies' (we're undersold, smarter than other consultants, more focused, we know what works and what doesn't) – although we may not often be given credit for these. [Resp. 13].
- Quantity surveyors are often a hugely underrated profit centre (within multi-disciplinary organisations) [Resp. 13].

4.4 Situation Analysis Internal Factors (Attributes)

The Internal Factors are generated and presented in same manner as described for the External Factors in section 4.3 above.

4.4.1 Management Attributes

'Management' attributes are those Internal Factors that are generally under the control of those responsible for the management of the firm.

4.4.1.1 Leadership

Internal Factor description:

Effective leadership – the original description *Effective top-down leadership* was broadened following second round reviewers' feedback to reflect the sentiment that leadership could occur at multiple levels of the organisation.

Exploratory interview data:

- 'Effective leadership' was described as a top down approach [Resp. 1] with strong and effective decision making [Resp. 2].
- In a partnership or large firm, it was said to require good partners that support each other, and compatible personalities with a similar work ethic to ensure internal harmony [Resp. 13].
- It may mean leading from the front rather than a reliance on processes, particularly in high risk services [Resp. 2].

4.4.1.2 Market awareness

Internal Factor description:

Acute awareness of trends and changes in the marketplace

Exploratory interview data:

Respondents described the ability to identify emerging trends and changes as an understanding of the market [Resp. 3] achieved through the scanning of horizons and early anticipation of changes [Resp. 2] to gain good situational awareness [Resp. 7] such as changes in procurement approaches [Resp. 3].

Traditional, conservative, risk averse, non-progressive mindsets [Resp. 11] as well as complacency [Resp. 14] and uptight-ness [Resp. 1] were seen as relevant weaknesses. Qs were urged to adapt and look beyond bills of quantities (traditional services) [Resp. 15].

4.4.1.3 Strategic management

Internal Factor description:

Formulation and implementation of strategic actions

Exploratory interview data:

- Related to the preceding attribute is the ability to respond to the market [Resp. 1] by strategically repositioning [Resp. 3] to changes in market demand [Resp. 1 / Resp. 10].
- Strategists as well as measurers [Resp. 10].
- Dynamic leadership [Resp. 9] that can move with market to find new propositions/selling points [Resp. 3] was seen as important.
- This was thought to require a process-oriented approach to marketing and business development and a willingness to move beyond comfort zones [Resp. 14].
- Respondents warned against remaining stuck to tradition [Resp. 3].
- Unfortunately, resistance to change [Resp. 7] and the challenging of traditional roles [Resp. 5] were noted as a weakness of the profession, as was strategic thinking [Resp. 10].

4.4.1.4 Firm flexibility

Internal Factor description:

Flexible and adaptable organisational structure

Exploratory interview data:

- Flexibility [Resp. 1 / Resp. 2 / Resp. 7 / Resp. 8] and adaptability [Resp. 1 / Resp. 7 / Resp. 15] were two oft-mentioned keywords in terms of an organisation's systems, structure and market orientation.
- Others described this as an ability to be 'fast moving' [Resp. 2].
- One respondent noted that the profession (individual professionals) is relatively adaptable [Resp. 1] and found agreement that quantity surveying services are relatively transportable/portable [Resp. 1 / Resp. 15].

4.4.1.5 People management

Internal Factor description:

'Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc)' – the original description '*Effective human resource management*' was elaborated on following feedback received from second round reviewers.

Exploratory interview data:

Good Human Resource management is the recruitment and retention of the right mix of people that fit with an organisation's culture:

- Several respondents felt that having the 'best' people was a key attribute [Resp. 2 / Resp. 5 / Resp. 13 / Resp. 15].
- Unfortunately, there is intense competition for people [Resp. 14] so the ability to attract the best quality people is important [Resp. 15].

- Recruitment must provide the right mix of people (comprising leaders, change agents, technicians) [Resp. 11].
- Respondent's generally promoted diversity as important in the people mix [Resp. 2 / Resp. 7 / Resp. 12], possibly currently an area of weakness [Resp. 7].
- Access to new talent such as through universities [Resp. 14].
- Retaining key individuals [Resp. 1 / Resp. 11] and longevity through staff loyalty and commitment [Resp. 13].
- A good personal match with the organisation [Resp. 2] particularly a good fit with key staff [Resp. 1].

4.4.2 People Attributes

The role 'people' play to the organisation's success was a common theme. The following 'People' Factors summarize the main qualities considered important for individual QS's to hold.

4.4.2.1 *Interpersonal skill*

Internal Factor description:

Interpersonal and relationship building skills, emotional intelligence – the original description, simply *Interpersonal and relationship building skills* was elaborated on following second round reviewers' feedback.

Exploratory interview data:

- Individuals' abilities to build and maintain client relationships [Resp. 1 / Resp. 2 / Resp. 3 / Resp. 4 Resp. 13].
- Personality is a keyword [Resp. 4 / Resp. 6 / Resp. 8].

4.4.2.2 *Communication skill*

Internal Factor description:

'Communication, presentation and negotiation skills' – the original description *'Communication and presentation skills'* was extended following second round reviewers' feedback.

Exploratory interview data:

- Overall, technical competencies become secondary as people advance and interpersonal and communication skills become more important such as the ability to analyse information and present it in a logical and clear manner, and express conclusions in words [Resp. 14].
- Must understand what the client is asking and communicate in a way that the client understands. Good English is really important [Resp. 15].
- Other soft skills include negotiation [Resp. 6 / Resp. 7], people skills [Resp. 6] and emotional intelligence [Resp. 7].
- Confidence [Resp. 1].

4.4.2.3 *Rigour*

Internal Factor description:

Accuracy, credibility and reliability

Exploratory interview data:

- Credibility in service delivery [Resp. 3 / Resp. 5 / Resp. 8] described by one respondent as ‘professional power and authority’ [Resp. 1].
- Timeliness [Resp. 8 / Resp. 13] and timely reporting to enable informed decision making [Resp. 3].
- Reliability and certainty of delivery, particularly in terms of cost information [Resp. 3 / Resp. 13].
- Accuracy in cost reporting and management [Resp. 3 / Resp. 8].
- The quality of service / output [Resp. 11 / Resp. 15].

4.4.2.4 Teamwork

Internal Factor description:

Leadership and teamwork attributes

Exploratory interview data:

Quantity surveyors must be leaders, risk takers and value adders within project teams:

- Must add value beyond the basic expectations [Resp. 1 / Resp. 5 / Resp. 6 / Resp. 10 / Resp. 11].
- Must be relevant [Resp. 11] and provide worthwhile advice [Resp. 8] that contributes to successful project outcomes [Resp. 3].
- “Be able to say something that is interesting” [Resp. 5] underpinned by an understanding of client and project needs and drivers [Resp. 2 / Resp. 3 / Resp. 6 / Resp. 9].

- Leadership is important [Resp. 6 / Resp. 5 / Resp. 9], but unfortunately this is often viewed as a weakness of the profession [Resp. 5 / Resp. 9].
- Unfortunately, the profession is sometimes seen as ‘Teflon coated’ and unwilling to take on appropriate risk [Resp. 5 / Resp. 7].
- Willingness to go the extra mile [Resp. 13]

4.4.2.5 Ethics

Internal Factor description:

‘Honesty, trustworthiness and impartiality (ethical conduct)’ – the original description

‘Honesty, trustworthiness and impartiality’ was revised following second round reviewers’ feedback to include the ‘ethics’ keyword.

Exploratory interview data:

The importance of being trusted as an independent and impartial advisor with a high standard of ethical behaviour:

- The ‘Honest Broker’ reputation [Resp. 5 / Resp. 7 / Resp. 14].
- Impartial [Resp. 5] and independent [Resp. 6 / Resp. 8].
- Respected and trusted advisor status [Resp. 8 / Resp. 11].
- ‘Policeman’ of the industry [Resp. 8].
- Important character traits include a high standard of ethics [Resp. 14] and personal integrity [Resp. 11].
- Pride for and respect of profession [Resp. 12].

4.4.3 Network and Marketing Attributes

‘Network and Marketing’ attributes are those Internal Factors that focus on representing the firm and building its profile among external stakeholders.

4.4.3.1 *Relationship management*

Internal Factor description:

Identification and relationship management of key clients

Exploratory interview data:

- Essentially a structured approach to nurturing and managing client relationships [Resp. 1 / Resp. 3 / Resp. 4 / Resp. 7 / Resp. 9 / Resp. 11 / Resp. 13].
- Strategic selection of client base/network [Resp. 3].

4.4.3.2 *Client quality*

Internal Factor description:

High quality client-base

Exploratory interview data:

- A focus on loyal clients to generate repeat business [Resp. 1 / Resp. 4 / Resp. 8].
- Quality and calibre of clients (have the best clients) [Resp. 13].
- Avoidance of clients that couldn’t/wouldn’t pay; threat of bad debts/debtors [Resp. 13].

- Urged to get within close proximity to clients and decisions makers [Resp. 6 / Resp. 8] by getting ‘upstream/closer to the money’ [Resp. 3] or taking a ‘bold step up the food chain’ [Resp. 14]. Offer front-end/early stage services [Resp. 6 / Resp. 14] to be the first consultant appointed [Resp. 2] or at least as early as possible [Resp. 10].
- The ability to attract higher calibre/quality clients and charge the appropriate fee requires a correspondingly sophisticated service offering [Resp. 3 / Resp. 14].

4.4.3.3 Networks

Internal Factor description:

Extensive industry-wide networks (across clients, suppliers and partners/peers)

Exploratory interview data:

- Overall; those who provide the work have changed [Resp. 10], it now comes from a diverse range of sources [Resp. 10 / Resp. 12].
- Specific examples included: architects [Resp. 1]; main contractors [Resp. 7 / Resp. 9]; financial institutions, funders and banks [Resp. 10 / Resp. 12]; developers and investors [Resp. 7 / Resp. 10 / Resp. 12]; and the public sector [Resp. 10 / Resp. 12].
- Diversification of networks across industry segments, covering both public and private sectors [Resp. 2 / Resp. 3].

4.4.3.4 Brand

Internal Factor description:

Active marketing and brand promotion

Exploratory interview data:

- The importance of a strong brand [Resp. 1 / Resp. 6 / Resp. 8 / Resp. 9 / Resp. 13].
- Brand ought to be based on reputation and a legacy of success [Resp. 4 / Resp. 8 / Resp. 13].
- The need for recognition [Resp. 1 / Resp. 9] and visibility [Resp. 5 / Resp. 9] in the marketplace.
- The need for a greater identity or profile [Resp. 1 / Resp. 4 / Resp. 6 / Resp. 10]. Many observed that the current profile of quantity surveyors within the industry was too low [Resp. 4 / Resp. 6 / Resp. 11 / Resp. 15].
- The importance of effective marketing [Resp. 6 / Resp. 7 / Resp. 9 / Resp. 11 / Resp. 12 / Resp. 13 / Resp. 15] and the collective benefit of individual and combined marketing efforts [Resp. 1 / Resp. 13 / Resp. 15].

4.4.3.5 *International reach*

Internal Factor description:

International presence or connections (with clients, suppliers and partners/peers)

Exploratory interview data:

- The ability to compete on the world stage either by an international presence [Resp. 1 / Resp. 14] or global networks [Resp. 5].
- The ability to profit from international flows of money [Resp. 5], in particular investment flows from, and in, neighbouring Asian economies [Resp. 1].

- International partnering for business improvement / benchmarking / resource levelling / offshoring of some services [Resp. 1 / Resp. 5 / Resp. 15].

4.4.4 Practice and Process Attributes

‘Practice and Process’ attributes are those Internal Factors look inward at how the firm goes about service delivery and the tools, systems and processes in place to support this.

4.4.4.1 Knowledge management

Internal Factor description:

Knowledge capture and management systems (databases)

Exploratory interview data:

- The ability to acquire knowledge where it is lacking [Resp. 8] such as in emerging sectors [Resp. 12].
- Knowledge management systems [Resp. 2] and information databases [Resp. 1] for the storage of acquired knowledge [Resp. 13].
- The ability to share knowledge and cross pollinate ideas across silos [Resp. 7].

4.4.4.2 Work methods

Internal Factor description:

Efficient and reliable work methods (tools and templates)

Exploratory interview data:

- On the job efficiency [Resp. 1] through good behind-the-scenes processes and procedures [Resp. 8].
- Tools that enable effective ‘job costing’, the ability to capture time against budgets and structure fees appropriately [Resp. 14].

4.4.4.3 IT systems

Internal Factor description:

State of the art information technology systems

Exploratory interview data:

- General IT proficiency [Resp. 1 / Resp. 8].
- The importance of technology generally [Resp. 1 / Resp. 5 / Resp. 15].
- Businesses ought to be built around the operating technologies (such as Building Information Modelling) [Resp. 9 / Resp. 11 / Resp. 15] with state-of-the-art or best practice technology. However, it is not necessary to be an industry leader [Resp. 14].
- Quantity surveyors have been slow to move with technology which is a weakness [Resp. 10 / Resp. 11 / Resp. 15].

4.4.4.4 Training

Internal Factor description:

Training and up-skilling initiatives

Exploratory interview data:

- ‘Training’ is a keyword [Resp. 1 / Resp. 6 / Resp. 7 / Resp. 8 / Resp. 9 / Resp. 12].
- Technical training is required to up-skill for new technology [Resp. 9] new and emerging sectors [Resp. 3], and specialist areas [Resp. 1] such as building engineering, building services [Resp. 6].
- Training and development delivered through a combination of training programmes, in-house learning and continuing professional development CPD [Resp. 10].
- People development extends to the mentoring [Resp. 9 / Resp. 10] and development of emerging leaders for succession planning [Resp. 12] and staff retention [Resp. 11].
- Qs need to keep up with current thinking, and current issues, and legislation changes [Resp. 15].

4.4.4.5 Innovation capture

Internal Factor description:

Channels for capturing innovation and creativity

Exploratory interview data:

- Innovation is a keyword [Resp. 3 / Resp. 6].
- Research and Development by individual firms to remain at the forefront of change [Resp. 12] and for positioning for competitive advantage [Resp. 5].
- Technology needs to be embraced [Resp. 1] which means adopting, and adapting to, new technologies [Resp. 6] and tailoring services to integrate new technologies [Resp. 14].

- The profession's complacency about the status quo is seen as a weakness [Resp. 14].

4.4.5 Core Competency Attributes

'Core Competency' attributes are those Internal Factors that deal with the core technical competencies required of a QS firm. These technical competencies are clearly documented in the literature, so these were not covered in-depth during the interviews. Respondents generally pointed towards a good grasp of the core competencies as a critical underpinning for quantity surveying organisations.

Education and qualifications were considered important starting point [Resp. 9 / Resp. 10] underpinned by relevant experience [Resp. 7 / Resp. 10] in general areas as well as sector specific [Resp. 3] and international experience [Resp. 1]. Many cited the general importance of a good grasp of the core technical skills and competencies [Resp. 1 / Resp. 2 Resp. 4 / Resp. 7 / Resp. 8]. Each of the specific core competency areas are addressed below.

4.4.5.1 *Measurement ability*

Internal Factor description:

Measurement and quantification skills

Exploratory interview data:

- Measurement [Resp. 5] is a core skill of the quantity surveyor.
- An objective, logical view of project [Resp. 5 / Resp. 6 / Resp. 12] combined with a rigorous approach [Resp. 12] and the ability to interrogate information [Resp. 8] are critical underpinnings.

4.4.5.2 Estimating ability

Internal Factor description:

Estimating, cost planning and value and financial risk management skills – the original description

Estimating and cost planning skills was refined following second round reviewers' feedback to include a focus on risk.

Exploratory interview data:

- Understanding of development feasibilities [Resp. 4 / Resp. 9] and general cost planning, estimating and valuations [Resp. 9].
- Requires an ability to identify and balance the cost implications of risk [Resp. 3 / Resp. 6].
- Good cost understanding and advice is a project enabler [Resp. 5 / Resp. 6].
- Requires practitioners that are skilled in analytical breaking down and pricing of a project's components [Resp. 5] with an ability to understand construction process and identify scope and key drivers of cost to identify where to concentrate effort [Resp. 6].

4.4.5.3 Cost control ability

Internal Factor description:

Project financial administration, reporting and control skills – the original description

Project cost accounting and administration skills was revised following second round reviewers' feedback.

Exploratory interview data:

- Project cost management [Resp. 9]. To add value in this space requires the ability to forecast cashflows [Resp. 3] and key knowledge areas including an understanding of the financial drivers of business [Resp. 5] among others.

4.4.5.4 Cost knowledge

Internal Factor description:

'Cost knowledge (rates, labour constants, market changes)' – the original description, *'Cost knowledge (rates, labour constants)'*, was revised to acknowledge the impact of market dynamics following second round reviewers' feedback.

Exploratory interview data:

- Quantity surveyors are well positioned due to the unique coupling of construction and cost knowledge [Resp. 3].

4.4.5.5 Construction knowledge

Internal Factor description:

'Construction knowledge (technical, methodology, materials, risks)' – the original description, *'Building knowledge (building technologies, processes, materials)'*, was refined following second round reviewers' feedback.

Exploratory interview data:

Building knowledge [Resp. 10] extends to an understanding of existing and new construction methods and technologies [Resp. 9 / Resp. 3 / Resp. 15] as well as build-ability and

programming [Resp. 3] which is often where main contractors are seen to offer more value than a QS [Resp. 15].

4.4.5.6 Legal knowledge

Internal Factor description:

Regulatory, legal and contractual knowledge and risk awareness – the original description, *Statutory knowledge (construction law, standards, forms of contract)*, was revised following second round reviewers' feedback.

Exploratory interview data:

- Requires knowledge of:
 - Contract advice [Resp. 7]
 - Commercial law [Resp. 5]
 - Dispute resolution [Resp. 10]

4.5 Developed Situation Analysis Framework

The identified constructs for the External Factors (Forces) and Internal Factors (Attributes) were categorised into sub-groups as a guiding framework. This framework provides a rational structure for presentation of the constructs which is more manageable than simply a long list. It also enables for a methodical approach to the checking and comparing of the interview findings with existing literature; both at a group and individual construct level.

The situation analysis factors framework is presented in two parts. The first part, in Table 13, categorises External Factors and the second, Table 14, list Internal Factors.

Table 13: Framework of External Factors (Forces) for QS Firm Situation Analysis

| | | |
|------------|------------------------------|---|
| 1.1 | Outside Forces | |
| 1.1.1 | Associated professions | Blurring boundaries with associated construction services (such engineers or project/facilities/asset managers) |
| 1.1.2 | Non-construction professions | Blurring market boundaries with non-construction professionals (lawyers, accountants, management consultants, financial services providers) |
| 1.1.3 | Non-building | Demand from the non-building sectors of the construction industry (such as construction of mining, energy or transport infrastructure) |
| 1.1.4 | Other industries | Demand from other industries (e.g.: manufacturing, events, healthcare, or disaster relief) |
| 1.1.5 | Environmental services | Demand for emerging environmental services (e.g.: carbon accounting, environmental economics, sustainability audits) |
| 1.1.6 | Barriers to entry | The barriers to entry for new competitors (such as professional registration, requisite knowledge, technology etc.) |
| 1.2 | Substitute Forces | |
| 1.2.1 | IT substitutions | IT advances with the potential to replace some of the more process-oriented aspects of QS work |
| 1.2.2 | Non-traditional procurement | Construction contracts or procurement approaches that require less QS involvement (e.g. turnkey design & build) |
| 1.2.3 | Lead consultants | Lead consultants (architects or project managers) who manage projects (in whole or in part) without independent QS involvement |
| 1.2.4 | In-house QS | Developers and clients with their own cost management resources |
| 1.2.5 | Public cost data | Publicly available construction cost data |
| 1.3 | Supply Forces | |
| 1.3.1 | Qualifications | The style and quality of QS qualifications offered by tertiary education institutions |
| 1.3.2 | Employment market | The availability of suitably skilled, qualified and experienced practitioners |
| 1.3.3 | IT advances | IT advances that promise more efficient ways of working (such as Building Information Modelling) |
| 1.3.4 | Upstream information | The quality of design and information produced by other consultants (designers, project managers, etc) |
| 1.4 | Demand Forces | |
| 1.4.1 | Industry cycles | Fluctuations in demand due to the cyclical nature of the construction industry |
| 1.4.2 | Private sector | The current level of recognition of - and demand for - QS services from private sector clients |
| 1.4.3 | Public sector | The current level of recognition of - and demand for - QS services from government / public sector |
| 1.4.4 | Associated professionals | The current level of recognition of - and demand for - QS services from associated professions (architects / project managers) |
| 1.4.5 | Contractor demand | The current level of recognition of - and demand for - QS services from building contractors (and subcontractors) |
| 1.4.6 | Supply chain position | The quantity surveyor's typical position on the construction supply chain (proximity to client) |
| 1.4.7 | International demand | International demand for local QS service providers (particularly from other regions experiencing stronger economic growth) |
| 1.5 | Inside Forces | |

| | | |
|-------|----------------------------|---|
| 1.5.1 | Institute CPD | The quality of continuing professional development (CPD) programs offered by QS institutes |
| 1.5.2 | Institute profile | The quality of marketing and profile building initiatives by QS institutes |
| 1.5.3 | Professional collaboration | The current level of profession-wide collaboration on knowledge and data sharing and research |
| 1.5.4 | Price competition | The impact of QS practices which choose to compete on cost rather than quality (fee cutting) |
| 1.5.5 | Large firms | The increasing number and size of 'large' QS firms |
| 1.5.6 | Profession lifecycle | The current lifecycle stage of the traditional QS industry (growth or decline) |

The table below presents the distilled list of 26 Internal Factors.

Table 14: Framework of Internal Factors (Attributes) for QS Firm Situation Analysis

| | | |
|------------|---|--|
| 2.1 | Management Attributes | |
| 2.1.1 | Leadership | Effective leadership |
| 2.1.2 | Market awareness | Acute awareness of trends and changes in the marketplace |
| 2.1.3 | Strategic management | Formulation and implementation of strategic actions |
| 2.1.4 | Firm flexibility | Flexible and adaptable organisational structure |
| 2.1.5 | People management | Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc). |
| 2.2 | People Attributes | |
| 2.2.1 | Interpersonal skill | Interpersonal and relationship building skills, emotional intelligence |
| 2.2.2 | Communication skill | Communication, presentation and negotiation skills |
| 2.2.3 | Rigour | Accuracy, credibility and reliability |
| 2.2.4 | Teamwork | Leadership and teamwork attributes |
| 2.2.5 | Ethical conduct | Honesty, trustworthiness and impartiality (ethical conduct) |
| 2.3 | Network and Marketing Attributes | |
| 2.3.1 | Relationship management | Identification and relationship management of key clients |
| 2.3.2 | Client quality | High quality client-base |
| 2.3.3 | Networks | Extensive industry-wide networks (across clients, suppliers and partners/peers) |
| 2.3.4 | Brand | Active marketing and brand promotion |
| 2.3.5 | International reach | International presence or connections (with clients, suppliers and partners/peers) |
| 2.4 | Practice and Process Attributes | |
| 2.4.1 | Knowledge management | Knowledge capture and management systems (databases) |
| 2.4.2 | Work methods | Efficient and reliable work methods (tools and templates) |
| 2.4.3 | IT systems | State of the art information technology systems |
| 2.4.4 | Training | Training and up-skilling initiatives |
| 2.4.5 | Innovation capture | Channels for capturing innovation and creativity |
| 2.5 | Core Competency Attributes | |
| 2.5.1 | Measurement ability | Measurement and quantification skills |
| 2.5.2 | Estimating ability | Estimating, cost planning and value and financial risk management skills |
| 2.5.3 | Cost control ability | Project financial administration, reporting and control skills |
| 2.5.4 | Cost knowledge | Cost knowledge (rates, labour constants, market changes) |
| 2.5.5 | Construction knowledge | Construction knowledge (technical, methodology, materials, risks) |
| 2.5.6 | Legal knowledge | Regulatory, legal and contractual knowledge and risk awareness |

4.6 Success Indicators

Respondents were consistently able to point to “profit” as the key indicator or definition of success but were also quick to warn against a narrow focus solely on profit. In all, three key indicators of success emerged.

4.6.1 Sustained profitability

Respondents pointed to profit as the main definition of overall business success: “money is a key driver” [Resp. 7] and “profit” is the main measure [Resp. 3 / 6 / 7 / 10 / 12 / 13 / 14]. Respondents qualified this with the caveat that any profit had to be more than short term and not at the cost of the long-term survival [Resp. 3 / 6 / 10 / 12 / 13 / 14]. One respondent particularly cautioned against focussing on profit to the detriment of services quality and reputation -as this would ultimately in turn impact on negatively on profitability [Resp. 6].

4.6.2 Turnover growth

Closely linked to profit, was the idea of growth in relation to financial turnover [Resp. 3 / 6 / 7 / 8 / 13]. However, the need for growth to be sustainable and considered together with its impact on profit was a strong theme [Resp. 3 / 6 / 7 / 8 / 13]. Some respondents cautioned against ‘growth for growth’s sake’ [Resp. 7 / 8] and acknowledged that not all organisations would be looking to grow [Resp. 3].

4.6.3 The importance of non-owner stakeholder satisfaction

A third but weaker theme was the importance of stakeholder satisfaction. Both client [Resp. 6] and staff satisfaction [Resp. 6 / 7] were considered important. However, it was noted that an undue focus on client satisfaction at the cost of profitability would not constitute success [Resp. 6].

4.7 Chapter Summary

The purpose of this chapter was to present the findings in relation to the three objectives underpinning the second research aim; which is to identify what the key Internal and External Factors are for QS firms to consider during strategic planning.

Objective 1(a) (to identify the key External Factors that should be considered in QS firms' strategic planning process) has been addressed with a framework of 28 Forces organized into five categories, summarized in Table 13. Similarly, objective 1(b) (to identify the key Internal Factors that should be considered in QS firms' strategic planning process) was responded to with a framework of 26 Attributes, also organized into five categories, presented in Table 14. Definitions of success were identified and are set out in section 4.6, addressing objective 1(c) (to establish how QS firms measure success).

As well as filling a key identified knowledge gap, the developed Internal and External Factor frameworks also provides a platform for the next stages of the research to build on. The framework will firstly be operationalized to inform the design of the questionnaire for the descriptive research phases (see chapter 5.0). Following quantitative analysis, the framework will be further developed to inform the research model (see chapter 6.0). The findings on how QS firms define success enabled

testing of the developed model (see chapter 7.0). Discussion of these findings with reference to the extant literature is discussed in chapter 8.0.

5.0 DESCRIPTIVE RESEARCH RESULTS

5.1 Chapter Introduction

This chapter presents the results of the descriptive research phase which consisted of the gathering of quantitative data through questionnaire surveys. The primary research aim that this chapter sets out to address is to quantify the relative importance of the Internal Factors; the relative impact of the External Factors, and; the degree of matching between combinations of Internal and External Factors.

Specifically, this is achieved through addressing eight objectives:

- a. To quantify the perceived impact of the established External Factors in the operating environment;
- b. To quantify the importance placed on the Internal Factors in view of the state the External Factors at the same time;
- c. To establish whether perceptions of Internal Factor importance and External Factor impact change over time;
- d. To establish whether perceptions of Internal factor importance and External Factor impact are culturally specific;
- e. To establish whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders;
- f. To establish whether perceptions of Internal factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with carrying it out;

- g. To quantify the extent to which Internal Factors can be matched with External Factors (External Factor / Internal Factor relationship) resulting in strengths leveraged, opportunities missed, weaknesses undermined, and threats mitigated, and;
- h. To establish whether the strength of External Factor / Internal Factor relationships change over time.

The following hypotheses set in Chapter 3.0 are addressed:

- Hypothesis 1 – which tests whether perceptions of Internal Factor importance and External Factor impact change over time.
- Hypothesis 2 – which tests whether perceptions of Internal factor importance and External Factor impact are geo-political specific.
- Hypothesis 3 – which tests whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders.
- Hypothesis 4 – which tests whether perceptions of Internal factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with for carrying it out.
- Hypothesis 5 – which tests whether a relationship exists between the perceived impact of External Factors and perceived importance of Internal Factors.
- Hypothesis 6 – which tests whether Force-Attribute relationships remain constant over time.

The results of the hypotheses tests are presented in section 5.5.

Data was gathered in two rounds of observation. The original observation was carried out in 2013, with a follow-up observation undertaken in 2020. The results of the original observations are

presented in section 5.2, and the results of the follow-up observation in section 5.3. The results of comparisons between the two observations are presented in section 5.4.

The following tables present the qualitative interpretation scales that will be used through this chapter to describe the quantitative results.

Table 15: External Factor Polarised Impact Rating Interpretation Scale

| Rating | Interpretation |
|----------------|------------------------------|
| -1.00 to -0.67 | Medium to large threat |
| -0.66 to -0.33 | Small to medium threat |
| -0.34 to 0.00 | Neutral to small threat |
| 0.00 to 0.33 | Neutral to small opportunity |
| 0.34 to 0.66 | Small to medium opportunity |
| 0.67 to 1.00 | Medium to large opportunity |

Table 16: External Factor Depolarised Impact Rating Interpretation Scale

| Rating | Interpretation |
|--------------|-------------------|
| 0.00 to 0.20 | Negligible impact |
| 0.21 to 0.40 | Low impact |
| 0.41 to 0.60 | Moderate impact |
| 0.61 to 0.80 | High impact |
| 0.81 to 1.00 | Extreme impact |

Table 17: Internal Factor Importance Rating Interpretation Scale

| Rating | Interpretation |
|--------------|-----------------------|
| 0.00 to 0.20 | Negligible importance |
| 0.21 to 0.40 | Slightly important |
| 0.41 to 0.60 | Moderately important |
| 0.61 to 0.80 | Highly important |
| 0.81 to 1.00 | Extremely important |

Table 18: Internal Factor Performance Rating Interpretation Scale

| Rating | Interpretation |
|--------------|-------------------------|
| 0.00 to 0.20 | Very poor performance |
| 0.21 to 0.40 | Poor performance |
| 0.41 to 0.60 | Good performance |
| 0.61 to 0.80 | High performance |
| 0.81 to 1.00 | Outstanding performance |

The following abbreviations are typically used throughout this chapter:

n = number of observations in sample (for the given variable)

m = sample mean (for the given variable)

s.d. = sample standard deviation (for the given variable)

r = rank (generally in descending order of magnitude, with 1 being the highest, or in the case of threats and opportunities, beginning with the highest rated opportunity at 1)

5.2 Original Observation Results

5.2.1 Outlier Identification and Removal

The first step in the data analysis was the identification and removal of outliers. Outliers in the independent and dependent variables were identified through both visual inspection of the data and analysis using SPSS. The results of the outlier identification process are outlined in the tables below.

Visual inspection singled out responses from one respondent (#21) that appeared to be repeated selections of the same rating response for multiple variables rather than considered ratings of each individual variable. All responses (80 datapoints) from this respondent were removed.

SPSS identifies both Outliers and Extreme Values. The definition of these is described in section 3.6.2.3 of the Methodology chapter. In total, SPSS identified 13 Extreme Values and a further 101 Outliers. Eight of the 13 Extreme Values had already been removed through the visual inspection described above.

Removal of respondent #21 responses and Extreme Values amounted to between 1.0% and 4.1% of the data removed for each variable. Removal of these as well as Outliers would have constituted removal of up to 13% of the data in extreme cases and of over 5% of the data in 14 (of 80) instances.

In order to avoid excessive reduction in data points, only Extreme Values and outliers identified from the visual inspection (respondent ID #21) were removed. Overall, this resulted in 85 of 7,118 (1.2%) data points being removed. Table 19 below shows the identification of ‘outliers’ and ‘extreme values’ in the External Factor impact data.

Table 19: Outlier Identification in External Factor Impact data

| External Factor | Total Resp. | Identified Outliers | | | | | | |
|------------------------------|-------------|---------------------|------------------------|--|------|--|--|-------|
| | | Visual Inspection | Extreme Values | Total Visual Inspection & Extreme Values | | Outliers | Total Visual Inspection, Extreme Values & Outliers | |
| | | Resp. ID | Resp. ID | Count | % | Resp. ID | Count | % |
| Associated professions | 104 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Non-construction professions | 103 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Non-building | 97 | 21 | 45, 44 , 11 | 4 | 4.1% | 80, 55, 13, 83, 73 | 9 | 9.3% |
| Other industries | 99 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Environmental services | 97 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Barriers to entry | 99 | 21 | . | 1 | 1.0% | 59, 33, 35, 11 | 5 | 5.1% |
| IT substitutions | 102 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Non-traditional procurement | 102 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Lead consultants | 103 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| In-house QS | 102 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Public cost data | 100 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Qualifications | 97 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Employment market | 98 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| IT advances | 100 | 21 | 68, 25 | 3 | 3.0% | 77, 96, 103, 94, 35 , 11 , 48, 47, 33, 79 | 13 | 13.0% |
| Upstream information | 99 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Industry cycles | 98 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Private sector | 97 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Public sector | 96 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Associated professionals | 98 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Contractor demand | 98 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Supply chain position | 97 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| International demand | 89 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Institute CPD | 97 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |

| | | | | | | | | |
|--|-------------|----|---|-----------|-------------|---|-----------|-------------|
| Institute profile | 95 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Professional collaboration | 93 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Price competition | 96 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Large firms | 96 | 21 | . | 1 | 1.0% | . | 1 | 1.0% |
| Profession lifecycle | 94 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Total | 2746 | - | - | 33 | 1.2% | - | 52 | 1.9% |
| Symbol Key: | | | | | | | | |
| (99) Extreme Values or Outliers removed by visual inspection | | | | | | | | |
| . No Extreme Values or Outliers identified | | | | | | | | |
| <u>99</u> Extreme Value or Outlier not visible on SPSS boxplot | | | | | | | | |

Table 20 below shows the identification of ‘outliers’ and ‘extreme values’ in the Internal Factor importance data.

Table 20: Outlier Identification in Internal Factor Importance data

| Internal Factor | Total Resp. | Identified Outliers | | | | | | |
|-------------------------|-------------|---------------------|----------------|--|------|----------------------------|--|------|
| | | Visual Inspection | Extreme Values | Total Visual Inspection & Extreme Values | | Outliers | Total Visual Inspection, Extreme Values & Outliers | |
| | | Resp. ID | Resp. ID | Count | % | Resp. ID | Count | % |
| Leadership | 90 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Market awareness | 90 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Strategic management | 91 | 21 | . | 1 | 1.1% | (21), 2 | 2 | 2.2% |
| Firm flexibility | 89 | 21 | . | 1 | 1.1% | 82, 32, 43, (21) | 4 | 4.5% |
| People management | 89 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Interpersonal skill | 91 | 21 | . | 1 | 1.1% | 66, <u>60</u> , (21) | 3 | 3.3% |
| Communication skill | 91 | 21 | . | 1 | 1.1% | (21) | 1 | 1.1% |
| Rigour | 91 | 21 | . | 1 | 1.1% | 47, (21) | 2 | 2.2% |
| Teamwork | 91 | 21 | . | 1 | 1.1% | 82, 47, 48, (21), <u>7</u> | 5 | 5.5% |
| Ethical conduct | 92 | 21 | . | 1 | 1.1% | 39, (21), <u>34</u> | 3 | 3.3% |
| Relationship management | 92 | 21 | (21) | 1 | 1.1% | . | 1 | 1.1% |
| Client quality | 91 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Networks | 90 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Brand | 91 | 21 | . | 1 | 1.1% | 35, (21) | 2 | 2.2% |
| International reach | 91 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Knowledge management | 90 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Work methods | 90 | 21 | . | 1 | 1.1% | 7, 66, 35 | 4 | 4.4% |
| IT systems | 91 | 21 | . | 1 | 1.1% | 101, 2, 48, 35 | 5 | 5.5% |

| | | | | | | | | |
|--|-------------|----------|----------|-----------|-------------|----------------------------------|-----------|-------------|
| Training | 90 | 21 | . | 1 | 1.1% | 35, 25, 101, 48 | 5 | 5.6% |
| Innovation capture | 89 | 21 | . | 1 | 1.1% | . | 1 | 1.1% |
| Measurement ability | 91 | 21 | (21) | 1 | 1.1% | 15, 66, 3, 27 | 5 | 5.5% |
| Estimating ability | 92 | 21 | (21) | 1 | 1.1% | 2 | 2 | 2.2% |
| Cost control ability | 90 | 21 | (21) | 1 | 1.1% | 66 | 2 | 2.2% |
| Cost knowledge | 91 | 21 | (21) | 1 | 1.1% | 66, 29 | 3 | 3.3% |
| Construction knowledge | 91 | 21 | (21) | 1 | 1.1% | 25, 15, 78, 3 | 5 | 5.5% |
| Legal knowledge | 91 | 21 | (21) | 1 | 1.1% | 25, 23, 102, 66, <u>15</u> | 5 | 5.5% |
| Total | 2356 | - | - | 26 | 1.1% | - | 67 | 2.8% |
| Symbol Key: | | | | | | | | |
| (99) Extreme Values or Outliers removed by visual inspection | | | | | | | | |
| . No Extreme Values or Outliers identified | | | | | | | | |
| <u>99</u> Extreme Value or Outlier not visible on SPSS boxplot | | | | | | | | |

Table 21 below shows the identification of ‘outliers’ and ‘extreme values’ in the Internal Factor performance data.

Table 21: Outlier Identification in Internal Factor Performance data

| Variable | Total Resp. | Identified Outliers | | | | | | |
|----------------------|-------------|---------------------|----------------|--|------|---|--|-------|
| | | Visual Inspection | Extreme Values | Total Visual Inspection & Extreme Values | | Outliers | Total Visual Inspection, Extreme Values & Outliers | |
| | | Resp. ID | Resp. ID | Count | % | Resp. ID | Count | % |
| Leadership | 77 | 21 | . | 1 | 1.3% | <u>2</u> , 91, 97, 63, 18, (21) | 7 | 9.1% |
| Market awareness | 78 | 21 | . | 1 | 1.3% | 97, (21) | 2 | 2.6% |
| Strategic management | 78 | 21 | . | 1 | 1.3% | 97, (21) | 2 | 2.6% |
| Firm flexibility | 78 | 21 | . | 1 | 1.3% | 63, 45, (21) | 3 | 3.8% |
| People management | 77 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Interpersonal skill | 77 | 21 | . | 1 | 1.3% | 88, (21) | 2 | 2.6% |
| Communication skill | 76 | 21 | . | 1 | 1.3% | 88, 45, (21) | 3 | 3.9% |
| Rigour | 75 | 21 | . | 1 | 1.3% | 102, (21) | 2 | 2.7% |
| Teamwork | 77 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Ethical conduct | 78 | 21 | (21) | 1 | 1.3% | 60, 34, 63, <u>32</u> , <u>78</u> , 48, 45 | 8 | 10.3% |

| | | | | | | | | |
|--|-------------|----------|----------|-----------|-------------|--|-----------|-------------|
| Relationship management | 79 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Client quality | 79 | 21 | . | 1 | 1.3% | 1 | 2 | 2.5% |
| Networks | 78 | 21 | . | 1 | 1.3% | 45 | 2 | 2.6% |
| Brand | 79 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| International reach | 76 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Knowledge management | 77 | 21 | . | 1 | 1.3% | 63, 45, 32, 1 , 66 , 18 , 97, (21) | 8 | 10.4% |
| Work methods | 77 | 21 | . | 1 | 1.3% | 66, 45, 97, (21) | 4 | 5.2% |
| IT systems | 76 | 21 | . | 1 | 1.3% | 68, 66, 45, 18 , 1 , 88 , 32, (21) | 8 | 10.5% |
| Training | 76 | 21 | . | 1 | 1.3% | (21) | 1 | 1.3% |
| Innovation capture | 77 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Measurement ability | 79 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Estimating ability | 79 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Cost control ability | 78 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Cost knowledge | 78 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Construction knowledge | 79 | 21 | . | 1 | 1.3% | . | 1 | 1.3% |
| Legal knowledge | 78 | 21 | . | 1 | 1.3% | 66,(21) | 2 | 2.6% |
| Total | 2016 | - | - | 26 | 1.3% | - | 67 | 3.3% |
| Symbol Key: | | | | | | | | |
| (99) Extreme Values or Outliers removed by visual inspection | | | | | | | | |
| . No Extreme Values or Outliers identified | | | | | | | | |
| <u>99</u> Extreme Value or Outlier not visible on SPSS boxplot | | | | | | | | |

5.2.2 Response Rate

As discussed in the research methods chapter low response rates in construction generally and in the quantity surveying field specifically we're concerned for this study. The Australian Institute of Quantity Surveyors (AIQS) and the NZ Institute of Quantity Surveyors (NZIQS) had total populations of 3691 and 1454 respectively in 2013 at the time of the original observation survey. The link to the online questionnaire was distributed via those organisations' e-Bulletins. According to both organisations, approximately 95% of members received e-bulletins, and according to the NZIQS, the e-Bulletin readership rate is approximately 40%. These factors reduce the effect of sampling frames to around 1403 and 553, Which translates to a response rate of 1% or under for the AIQS, and between 3% and

8.68% for the NZIQS. The NZIQS response rate is in line with expectations for this population (advice from the NZIQS was that response rates greater than 5% were unlikely). The AIQS response rate is lower than expected and may be to do with a perceived lack of benefit of participating in research undertaken by a non-Australian institution.

Table 22: Questionnaire Response Rates

| Sampling Frame | Population | | | Effective Sampling Frame | | |
|----------------|------------|----|-------|--------------------------|----|-------|
| | N | r | % | n | r | % |
| AIQS | 3691 | 14 | 0.38% | 1403 | 14 | 1.00% |
| NZIQS | 1454 | 48 | 3.30% | 553 | 48 | 8.68% |
| Total | 5145 | 62 | 1.21% | 1956 | 62 | 3.17% |

5.2.3 Normality Checks

Visual inspection of the data plotted on histograms suggested that some of the variables tended toward a normal distribution whilst others were clearly not normally distributed. Figure 15 gives examples of three variables which on visual inspection, appear to exhibit a distribution centred around the mean.

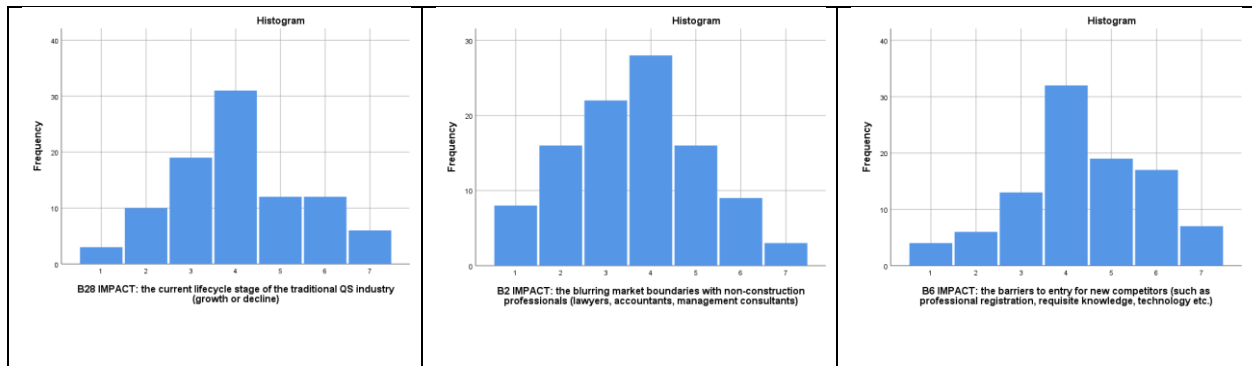


Figure 15: Examples of Variables with a Visual Central Tendency Distribution

Figure 16 on the other hand presents some examples of distributions that don't exhibit a central tendency. Data in these examples ranges from being skewed towards one end of a scale through to having two peaks at either end of a scale through to distributions with minor peaks and troughs.

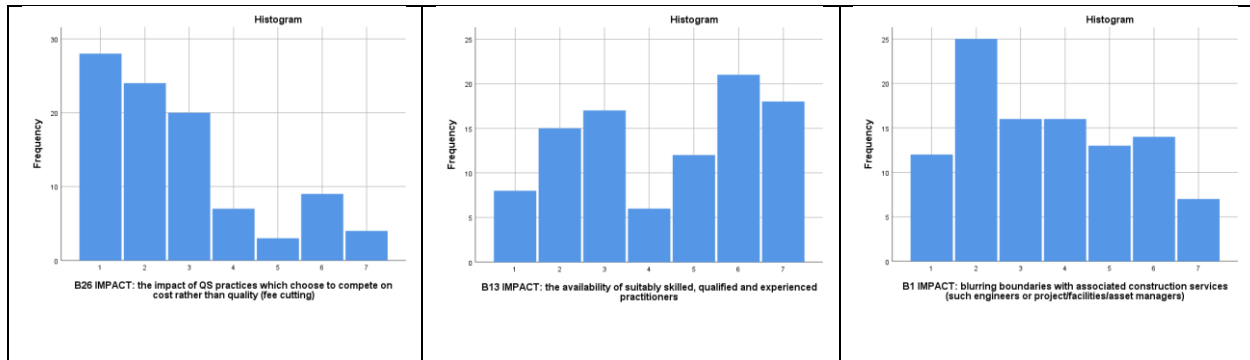


Figure 16: Examples of Variables with a Visual Non-Central Tendency Distribution

Nevertheless, the results of the Kolmogorov–Smirnov and the Shapiro-Wilk tests performed with SPSS both confirmed that the data was not normally distributed (for any of the variables), and therefore better suited to non-parametric statistical techniques (refer to section 3.6.2.6 for further discussion on this). Refer to Table 91 through to and including Table 93 in 0 for the full results of the normality tests.

5.2.4 Respondent Demographics

5.2.4.1 Primary Demographics

5.2.4.1.1 Professional Institute Membership

Over half of respondents were members of the AIQS or NZIQS representing 56.6% of respondents. The largest group was the NZIQS at 42.5%. The 42.5% of responses from 'other' is due to the informal sampling via the researcher's own networks as described and the research methods.

Table 23: Respondent Demographics – Professional Institute

| Professional Institute | count | rank | % | % |
|------------------------|------------|------|----------------|----------------|
| AIQS | 13 | 3 | 12.3% | 21.3% |
| NZIQS | 47 | 1 | 44.3% | 77.0% |
| AIQS & NZIQS | 1 | 4 | 0.9% | 1.6% |
| Other | 45 | 2 | 42.5% | excl |
| Total | 106 | | 100.00% | 100.00% |

5.2.4.1.2 Membership Grade

The largest group of respondents (49.1%) were members or associates of a professional institute, followed by the junior membership grades (17.9%), then ‘unknown’ (17%) and senior ‘fellow’ or ‘life’ members (15.1%).

Table 24: Respondent Demographics – Membership Grade

| Membership grade | count | rank | % | % |
|--|------------|------|---------------|---------------|
| Student / graduate / affiliate / probationer | 19 | 2 | 17.9% | 21.6% |
| Member / associate | 52 | 1 | 49.1% | 59.1% |
| Fellow / life member | 16 | 4 | 15.1% | 18.2% |
| Other | 1 | 5 | 0.9% | 1.1% |
| Unknown | 18 | 3 | 17.0% | excl |
| Total | 106 | | 100.0% | 100.0% |

5.2.4.1.3 Years of Professional Experience

By far the largest group represented were the highly experienced members with over 21 years or more experience. Members with 16 years’ experience or greater, accounted for over half of all respondents, reflecting the level of interest in the research, from senior members of the profession.

Table 25: Respondent Demographics – Years of Professional Experience

| Years of professional experience | count | rank | % | % |
|----------------------------------|------------|------|---------------|---------------|
| 0-5 years | 12 | 3 | 11.3% | 13.6% |
| 6-10 years | 10 | 6 | 9.4% | 11.4% |
| 11-15 years | 11 | 5 | 10.4% | 12.5% |
| 16-20 years | 12 | 3 | 11.3% | 13.6% |
| 21 years or more | 43 | 1 | 40.6% | 48.9% |
| Unknown | 18 | 2 | 17.0% | excl |
| Total | 106 | | 100.0% | 100.0% |

5.2.4.1.4 Position in Organisation

Again, the largest group of respondents were senior practitioners (37.7%) followed by the very senior managers and directors (20.8%) who again, together made up over half of all respondents, or over 70% of all known positions.

Table 26: Respondent Demographics – Position in Organisation

| Position in organisation | count | rank | % | % |
|--|------------|------|---------------|---------------|
| Cadet / junior professional | 5 | 6 | 4.7% | 5.7% |
| Intermediate professional | 12 | 4 | 11.3% | 13.6% |
| Senior professional / team lead / mid management | 40 | 1 | 37.7% | 45.5% |
| General manager / director / chief executive | 22 | 2 | 20.8% | 25.0% |
| Sole practitioner | 9 | 5 | 8.5% | 10.2% |
| Unknown | 18 | 3 | 17.0% | excl |
| Total | 106 | | 100.0% | 100.0% |

5.2.4.1.5 Organisation Type

Half of all known respondents came from QS firms, the next biggest group being construction contractors or subcontractors. The remaining respondents came from a mix of diversified property services consultancy's and other public or private institutions.

Table 27: Respondent Demographics – Organisation Type

| Organisation | count | rank | % | % |
|---|------------|------|---------------|---------------|
| Construction cost management consultancy | 42 | 1 | 39.6% | 50.0% |
| Diversified property services consultancy | 7 | 4 | 6.6% | 8.3% |
| Construction contractor or subcontractor | 20 | 3 | 18.9% | 23.8% |
| Client organisation | 6 | 5 | 5.7% | 7.1% |
| Bank or financier | 0 | 8 | 0.0% | 0.0% |
| Government (local/state/national) | 3 | 7 | 2.8% | 3.6% |
| Education provider | 6 | 5 | 5.7% | 7.1% |
| Unknown | 22 | 2 | 20.8% | excl |
| Total | 106 | | 100.0% | 100.0% |

5.2.4.1.6 *Current Role*

By far the largest group of respondents were quantity surveyors; 59.4% of all responses and close to 80% of all known responses; the next biggest group being project managers. Around 25% did not declare their current role.

Table 28: Respondent Demographics – Current Role

| Current role focus area | count | rank | % | % |
|--------------------------------|------------|------|---------------|---------------|
| Cost management | 63 | 1 | 59.4% | 79.7% |
| Project management | 10 | 3 | 9.4% | 12.7% |
| Facilities or asset management | 2 | 5 | 1.9% | 2.5% |
| Property development | 0 | 6 | 0.0% | 0.0% |
| Legal / dispute resolution | 4 | 4 | 3.8% | 5.1% |
| Unknown | 27 | 2 | 25.5% | excl |
| Total | 106 | | 100.0% | 100.0% |

5.2.4.2 *Secondary Demographics*

The following three primary demographics groups were created to enable testing of the hypotheses. The method of converting the original primary demographic data collected into the secondary groups is outlined in section 3.6.2.2 of the Methodology chapter. These three secondary demographic groups are presented in the following sections.

5.2.4.2.1 *NZIQS vs non-NZIQS Membership*

Of the 106 usable responses, 45.3% were from NZIQS members. Of these, 54.2% identified as Consultant Quantity Surveyors and 58.3% identified as Senior (having over 10 years relevant professional experience).

Table 29: NZIQS vs non-NZIQS Membership Respondent Demographics

| Demographic | NZIQS | | Non-NZIQS | | Unknown | | Total | |
|---|-------|-------|-----------|-------|---------|------|-------|-------|
| | Count | % | Count | % | Count | % | Count | % |
| Consultant Quantity Surveyor vs Non-Consultant Quantity Surveyor | | | | | | | | |
| Consultant Quantity Surveyor | 26 | 54.2% | 20 | 34.5% | 0 | 0.0% | 46 | 43.4% |

| | | | | | | | | |
|--|-----------|---------------|-----------|---------------|----------|-------------|------------|---------------|
| Non-Consultant Quantity Surveyor | 19 | 39.6% | 23 | 39.7% | 0 | 0.0% | 42 | 39.6% |
| Unknown | 3 | 6.3% | 15 | 25.9% | 0 | 0.0% | 18 | 17.0% |
| Subtotal | 48 | 100.0% | 58 | 100.0% | 0 | 0.0% | 106 | 100.0% |
| Senior vs Emerging Professional | | | | | | | | |
| Senior Professional | 28 | 58.3% | 27 | 46.6% | 0 | 0.0% | 55 | 51.9% |
| Emerging Professional | 17 | 35.4% | 16 | 27.6% | 0 | 0.0% | 33 | 31.1% |
| Unknown | 3 | 6.3% | 15 | 25.9% | 0 | 0.0% | 18 | 17.0% |
| Subtotal | 48 | 100.0% | 58 | 100.0% | 0 | 0.0% | 106 | 100.0% |
| Total | 48 | 45.3% | 58 | 54.7% | 0 | 0.0% | 106 | 100.0% |

5.2.4.2.2 Consulting Quantity Surveyors vs non-Consulting Quantity Surveyors

More respondents identified as being Consultant Quantity Surveyors (43.4%) than any other profession (39.6%). Of these, the majority were Senior professionals (63.0%) and NZIQS members (56.5%).

Table 30: Consultant Quantity Surveyor vs non-Consultant Quantity Surveyor Respondent Demographics

| Demographic | Consultant Quantity Surveyor | | Non-Consultant Quantity Surveyor | | Unknown | | Total | |
|--|------------------------------|---------------|----------------------------------|---------------|-----------|---------------|------------|---------------|
| | Count | % | Count | % | Count | % | Count | % |
| NZIQS vs non-NZIQS Member | | | | | | | | |
| NZIQS Member | 26 | 56.5% | 19 | 45.2% | 3 | 16.7% | 48 | 45.3% |
| Non-NZIQS Member | 20 | 43.5% | 23 | 54.8% | 15 | 83.3% | 58 | 54.7% |
| Unknown | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Subtotal | 46 | 100.0% | 42 | 100.0% | 18 | 100.0% | 106 | 100.0% |
| Senior vs Emerging Professional | | | | | | | | |
| Senior Professional | 29 | 63.0% | 26 | 61.9% | 0 | 0.0% | 55 | 51.9% |
| Emerging Professional | 17 | 37.0% | 16 | 38.1% | 0 | 0.0% | 33 | 31.1% |
| Unknown | 0 | 0.0% | 0 | 0.0% | 18 | 100.0% | 18 | 17.0% |
| Subtotal | 46 | 100.0% | 42 | 100.0% | 18 | 100.0% | 106 | 100.0% |
| Total | 46 | 43.4% | 42 | 39.6% | 18 | 17.0% | 106 | 100.0% |

5.2.4.2.3 Senior vs Emerging Professionals

51.9% of respondents reported having over 10 years relevant professional experience. Of these, 52.7% were Consultant Quantity Surveyors and 50.9% were also NZIQS members.

Table 31: Senior vs Emerging Professionals Respondent Demographics

| Demographic | Senior Professional | | Emerging Professional | | Unknown | | Total | |
|---|---------------------|---------------|-----------------------|---------------|-----------|---------------|------------|---------------|
| | Count | % | Count | % | Count | % | Count | % |
| Consultant Quantity Surveyor vs Non-Consultant Quantity Surveyor | | | | | | | | |
| Consultant Quantity Surveyor | 29 | 52.7% | 17 | 51.5% | 0 | 0.0% | 46 | 43.4% |
| Non-Consultant Quantity Surveyor | 26 | 47.3% | 16 | 48.5% | 0 | 0.0% | 42 | 39.6% |
| Unknown | 0 | 0.0% | 0 | 0.0% | 18 | 100.0% | 18 | 17.0% |
| Subtotal | 55 | 100.0% | 33 | 100.0% | 18 | 100.0% | 106 | 100.0% |
| NZIQS vs non-NZIQS Member | | | | | | | | |
| NZIQS Member | 28 | 50.9% | 17 | 51.5% | 3 | 16.7% | 48 | 45.3% |
| Non-NZIQS Member | 27 | 49.1% | 16 | 48.5% | 15 | 83.3% | 58 | 54.7% |
| Unknown | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Subtotal | 55 | 100.0% | 33 | 100.0% | 18 | 100.0% | 106 | 100.0% |
| Total | 55 | 51.9% | 33 | 31.1% | 18 | 17.0% | 106 | 100.0% |

5.2.5 External Factor Polarised Impacts

5.2.5.1 Overall Mean Polarised Impact Ratings

The table below presents the perceived likely impact ratings of external forces. The largest opportunities were thought to come from entry into non-building sectors of the construction industry, IT advances that promise more efficient ways of working, and offering environmental and sustainability services. The largest threats were perceived to be price competition (QS firms who take a cost leadership approach to competing), lead consultants (architects or project manager who manage without QS involvement) and in-house QS's.

Table 32: Rank Ordered Mean Polarised Impact Ratings of External Factors – All Respondents

| External Factor | n | m | s.d. | r | Interpretation |
|--------------------------|-----|------|------|----|------------------------------|
| Non-building | 93 | 0.51 | 0.41 | 1 | Small to medium opportunity |
| IT advances | 97 | 0.43 | 0.44 | 2 | Small to medium opportunity |
| Environmental services | 96 | 0.40 | 0.47 | 3 | Small to medium opportunity |
| Other industries | 98 | 0.38 | 0.48 | 4 | Small to medium opportunity |
| IT substitutions | 101 | 0.32 | 0.58 | 5 | Neutral to small opportunity |
| International demand | 88 | 0.31 | 0.53 | 6 | Neutral to small opportunity |
| Supply chain position | 96 | 0.24 | 0.58 | 7 | Neutral to small opportunity |
| Institute CPD | 96 | 0.23 | 0.53 | 8 | Neutral to small opportunity |
| Institute profile | 94 | 0.21 | 0.55 | 9 | Neutral to small opportunity |
| Associated professionals | 97 | 0.21 | 0.55 | 10 | Neutral to small opportunity |
| Contractor demand | 97 | 0.20 | 0.53 | 11 | Neutral to small opportunity |
| Public sector | 95 | 0.17 | 0.58 | 12 | Neutral to small opportunity |

| | | | | | |
|------------------------------|-----|-------|------|----|------------------------------|
| Professional collaboration | 92 | 0.16 | 0.56 | 13 | Neutral to small opportunity |
| Employment market | 97 | 0.13 | 0.67 | 14 | Neutral to small opportunity |
| Barriers to entry | 98 | 0.13 | 0.49 | 15 | Neutral to small opportunity |
| Qualifications | 96 | 0.13 | 0.58 | 16 | Neutral to small opportunity |
| Private sector | 96 | 0.06 | 0.59 | 17 | Neutral to small opportunity |
| Profession lifecycle | 93 | 0.02 | 0.49 | 18 | Neutral to small opportunity |
| Public cost data | 99 | 0.01 | 0.49 | 19 | Neutral to small opportunity |
| Upstream information | 98 | -0.03 | 0.53 | 20 | Neutral to small threat |
| Large firms | 95 | -0.04 | 0.55 | 21 | Neutral to small threat |
| Non-traditional procurement | 101 | -0.09 | 0.59 | 22 | Neutral to small threat |
| Non-construction professions | 102 | -0.11 | 0.50 | 23 | Neutral to small threat |
| Associated professions | 103 | -0.13 | 0.61 | 24 | Neutral to small threat |
| Industry cycles | 97 | -0.26 | 0.51 | 25 | Neutral to small threat |
| In-house QS | 101 | -0.31 | 0.52 | 26 | Neutral to small threat |
| Lead consultants | 102 | -0.34 | 0.56 | 27 | Small to medium threat |
| Price competition | 95 | -0.42 | 0.59 | 28 | Small to medium threat |

5.2.5.2 *Difference of Perception Between NZIQS and non-NZIQS Respondents*

The table below identifies the statistically significant variances between the perceptions of NZIQS and non-NZIQS respondents regarding External Factor Polarised Impact Ratings. Two Factors of disagreement were identified – other industries and public cost data.

Table 33: External Factor Polarised Impact Ratings – Difference of Perception Between NZIQS and non-NZIQS Respondents (Variances Only)

| External Factor Impact | NZIQS | | | | Non-NZIQS | | | | rank var. | U | p |
|------------------------|-------|-------|------|------|-----------|------|------|------|-----------|-----|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Other industries | 47 | 0.52 | 0.40 | 2 | 51 | 0.25 | 0.52 | 8 | 6 | 862 | 0.014 |
| Public cost data | 46 | -0.14 | 0.45 | 24 | 53 | 0.14 | 0.48 | 14 | -10 | 801 | 0.002 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

5.2.5.3 *Difference of Perception Between Emerging and Highly Experienced Respondents*

The table below identifies the statistically significant variances between the perceptions of emerging and highly experienced respondents regarding External Factor Polarised Impact Ratings. Two Factors of disagreement were identified – industry cycles and profession lifecycle.

Table 34: External Factor Polarised Impact Ratings – Difference of Perception Between Emerging and Highly Experienced Respondents (Variances Only)

| External Factor Impact | Emerging Professionals | | | | Senior Professionals | | | | rank var. | U | p |
|------------------------|------------------------|------|------|------|----------------------|-------|------|------|-----------|-------|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Industry cycles | 30 | 0.02 | 0.58 | 22 | 54 | -0.38 | 0.41 | 26 | 4 | 474.0 | 0.001 |
| Profession lifecycle | 30 | 0.21 | 0.49 | 14 | 50 | -0.08 | 0.42 | 20 | 6 | 500.0 | 0.011 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

5.2.5.4 *Difference of Perception Between Consulting Quantity Surveyors and Others*

The table below identifies the statistically significant variances between the perceptions of consulting QS's and non-consulting QS respondents regarding External Factor Polarised Impact Ratings. Only one Factor of disagreement was identified – employment market.

Table 35: External Factor Polarised Impact Ratings – Difference of Perception Between Consulting Quantity Surveyors and Others (Variances Only)

| External Factor Impact | Consulting QS | | | | Non-Consulting QS | | | | rank var. | U | p |
|------------------------|---------------|-------|------|------|-------------------|------|------|------|-----------|-----|-------|
| | n | mean | s.d. | Rank | n | mean | s.d. | rank | | | |
| Employment market | 42 | -0.06 | 0.63 | 21 | 40 | 0.54 | 1.06 | 4 | -17 | 578 | 0.013 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

5.2.6 External Factor Depolarised Impacts

The following table presents the impact ratings of the external factors. In this table, no differentiation is made between positive (opportunity) or negative (threat) impacts. The most impactful factor was thought to be 'price competition', followed by 'employment market' and 'IT substitutions'. Considered

to be of least impact was ‘publicly available cost data’ followed by ‘professional lifecycle’, ‘barriers to entry’ and ‘non-construction professions’.

Table 36: Rank Ordered Mean Depolarised Impact Ratings of External Factors – All Respondents

| External Factor | n | m | s.d. | r | Interpretation |
|------------------------------|-----|------|------|----|-----------------|
| Price competition | 95 | 0.65 | 0.31 | 1 | High impact |
| Employment market | 97 | 0.62 | 0.30 | 2 | High impact |
| IT substitutions | 101 | 0.59 | 0.30 | 3 | Moderate impact |
| Lead consultants | 102 | 0.56 | 0.33 | 4 | Moderate impact |
| Non-building | 93 | 0.56 | 0.34 | 5 | Moderate impact |
| Associated professions | 103 | 0.53 | 0.32 | 6 | Moderate impact |
| Public sector | 95 | 0.53 | 0.29 | 7 | Moderate impact |
| IT advances | 97 | 0.53 | 0.31 | 8 | Moderate impact |
| Environmental services | 96 | 0.52 | 0.33 | 9 | Moderate impact |
| Supply chain position | 96 | 0.52 | 0.35 | 9 | Moderate impact |
| In-house QS | 101 | 0.51 | 0.33 | 11 | Moderate impact |
| Private sector | 96 | 0.51 | 0.29 | 12 | Moderate impact |
| International demand | 88 | 0.51 | 0.35 | 13 | Moderate impact |
| Other industries | 98 | 0.50 | 0.36 | 14 | Moderate impact |
| Institute profile | 94 | 0.49 | 0.32 | 15 | Moderate impact |
| Non-traditional procurement | 101 | 0.49 | 0.34 | 16 | Moderate impact |
| Associated professionals | 97 | 0.49 | 0.32 | 17 | Moderate impact |
| Qualifications | 96 | 0.48 | 0.34 | 18 | Moderate impact |
| Institute CPD | 96 | 0.47 | 0.33 | 19 | Moderate impact |
| Professional collaboration | 92 | 0.47 | 0.34 | 20 | Moderate impact |
| Contractor demand | 97 | 0.46 | 0.33 | 21 | Moderate impact |
| Industry cycles | 97 | 0.44 | 0.35 | 22 | Moderate impact |
| Large firms | 95 | 0.43 | 0.34 | 23 | Moderate impact |
| Upstream information | 98 | 0.41 | 0.34 | 24 | Moderate impact |
| Non-construction professions | 102 | 0.40 | 0.32 | 25 | Low impact |
| Barriers to entry | 98 | 0.38 | 0.33 | 26 | Low impact |
| Profession lifecycle | 93 | 0.37 | 0.33 | 27 | Low impact |
| Public cost data | 99 | 0.35 | 0.34 | 28 | Low impact |

5.2.7 Internal Factor Importance

5.2.7.1 Overall Mean Importance Ratings

The following table presents importance rating of the internal factors. The most important internal factor was thought to be estimating ability, followed by rigour in approach (accuracy, credibility and reliability), ethical conduct, cost control skills, and interpersonal communication. Considered to be of

least importance were; the international reach of firms, state of the art IT systems and active marketing and brand promotion activities.

Table 37: Rank Ordered Mean Importance Rating of Internal Factors – All Respondents

| Internal Factor | n | m | s.d. | r | Interpretation |
|-------------------------|----|------|------|----|---------------------|
| Estimating ability | 91 | 0.93 | 0.21 | 1 | Extremely important |
| Rigour | 90 | 0.92 | 0.22 | 2 | Extremely important |
| Ethical conduct | 91 | 0.92 | 0.24 | 3 | Extremely important |
| Cost control ability | 89 | 0.89 | 0.25 | 4 | Extremely important |
| Communication skill | 90 | 0.88 | 0.22 | 5 | Extremely important |
| Relationship management | 91 | 0.87 | 0.23 | 6 | Extremely important |
| Measurement ability | 90 | 0.86 | 0.29 | 7 | Extremely important |
| Cost knowledge | 90 | 0.85 | 0.27 | 8 | Extremely important |
| Interpersonal skill | 90 | 0.85 | 0.27 | 9 | Extremely important |
| Construction knowledge | 90 | 0.84 | 0.32 | 10 | Extremely important |
| Training | 89 | 0.84 | 0.28 | 11 | Extremely important |
| Work methods | 89 | 0.84 | 0.28 | 12 | Extremely important |
| Teamwork | 90 | 0.84 | 0.28 | 13 | Extremely important |
| Firm flexibility | 88 | 0.83 | 0.29 | 14 | Extremely important |
| Networks | 89 | 0.82 | 0.29 | 15 | Extremely important |
| Legal knowledge | 90 | 0.82 | 0.29 | 16 | Extremely important |
| Market awareness | 89 | 0.82 | 0.33 | 17 | Extremely important |
| Knowledge management | 89 | 0.81 | 0.30 | 18 | Extremely important |
| Client quality | 90 | 0.80 | 0.31 | 19 | Extremely important |
| People management | 88 | 0.79 | 0.28 | 20 | Highly important |
| Leadership | 89 | 0.78 | 0.42 | 21 | Highly important |
| Strategic management | 90 | 0.77 | 0.30 | 22 | Highly important |
| Innovation capture | 88 | 0.76 | 0.33 | 23 | Highly important |
| Brand | 90 | 0.74 | 0.32 | 24 | Highly important |
| IT systems | 90 | 0.73 | 0.35 | 25 | Highly important |
| International reach | 90 | 0.65 | 0.45 | 26 | Highly important |

5.2.7.2 *Difference of Perception Between NZIQS and non-NZIQS Respondents*

The table below identifies the statistically significant variances between the perceptions of NZIQS and non-NZIQS respondents regarding Internal Factor Importance. Five Factors of disagreement were identified – leadership, rigour, ethical conduct, client quality, and measurement ability.

Table 38: Internal Factor Importance – Difference of Perception Between NZIQS and non-NZIQS Respondents (Variances Only)

| Internal Factor Importance | NZIQS | Non-NZIQS | | U | p |
|----------------------------|-------|-----------|--|---|---|
|----------------------------|-------|-----------|--|---|---|

| | n | mean | s.d. | rank | n | mean | s.d. | rank | rank var. | | |
|--|----|------|------|------|----|------|------|------|-----------|-----|-------|
| Leadership | 42 | 1.40 | 0.39 | 15 | 47 | 1.22 | 0.42 | 24 | 9 | 714 | 0.018 |
| Rigour | 43 | 1.60 | 0.16 | 1 | 47 | 1.49 | 0.26 | 3 | 2 | 796 | 0.029 |
| Ethical conduct | 44 | 1.59 | 0.19 | 2 | 47 | 1.49 | 0.27 | 3 | 1 | 832 | 0.040 |
| Client quality | 43 | 1.27 | 0.32 | 22 | 47 | 1.40 | 0.29 | 8 | -14 | 771 | 0.041 |
| Measurement ability | 43 | 1.49 | 0.26 | 5 | 47 | 1.37 | 0.30 | 13 | 8 | 783 | 0.044 |
| U = Mann-Whitney U p = 2-tailed Asymptotic Significance (p-value) | | | | | | | | | | | |

5.2.7.3 *Difference of Perception Between Emerging and Highly Experienced Respondents*

The table below identifies the statistically significant variances between the perceptions of emerging and highly experienced respondents regarding Internal Factor importance. Six Factors of disagreement were identified – firm flexibility, interpersonal skill, communication skill, knowledge management, cost control ability, and cost knowledge.

Table 39: Internal Factor Importance – Difference of Perception Between Emerging and Highly Experienced Respondents (Variances Only)

| Internal Factor Importance | Emerging Professionals | | | | Senior Professionals | | | | rank var. | U | p |
|--|------------------------|------|------|------|----------------------|------|------|------|-----------|-------|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Firm flexibility | 29 | 1.48 | 0.23 | 7 | 53 | 1.33 | 0.30 | 19 | 12 | 543.0 | 0.019 |
| Interpersonal skill | 31 | 1.52 | 0.21 | 6 | 53 | 1.38 | 0.28 | 13 | 7 | 607.5 | 0.030 |
| Communication skill | 31 | 1.57 | 0.20 | 2 | 53 | 1.44 | 0.21 | 5 | 3 | 540.0 | 0.003 |
| Knowledge management | 30 | 1.47 | 0.27 | 9 | 53 | 1.30 | 0.30 | 20 | 11 | 538.5 | 0.010 |
| Cost control ability | 31 | 1.58 | 0.17 | 1 | 53 | 1.44 | 0.26 | 5 | 4 | 554.0 | 0.005 |
| Cost knowledge | 31 | 1.53 | 0.22 | 5 | 53 | 1.40 | 0.27 | 11 | 6 | 596.0 | 0.022 |
| U = Mann-Whitney U p = 2-tailed Asymptotic Significance (p-value) | | | | | | | | | | | |

5.2.7.4 *Difference of Perception Between Consulting Quantity Surveyors and Others*

The table below identifies the statistically significant variances between the perceptions of consulting QS and non-consulting QS respondents regarding Internal Factor importance. Three Factors of disagreement were identified – networks, innovation capture, and construction knowledge.

Table 40: Internal Factor Importance – Difference of Perception Between Consulting Quantity Surveyors and Others (Variances Only)

| Internal Factor Importance | Consulting QS | | | | Non-Consulting QS | | | | rank var. | U | p |
|----------------------------|---------------|------|------|------|-------------------|------|------|------|-----------|-----|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Networks | 43 | 1.32 | 0.30 | 20 | 41 | 1.66 | 0.81 | 2 | -18 | 666 | 0.039 |
| Innovation capture | 43 | 1.19 | 0.37 | 25 | 40 | 1.61 | 1.07 | 8 | -17 | 634 | 0.030 |
| Construction knowledge | 43 | 1.35 | 0.32 | 16 | 41 | 1.65 | 0.65 | 4 | -12 | 666 | 0.035 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

5.2.8 Internal Factor Performance

5.2.8.1 Overall Mean Performance Ratings

The below table presents perceptions on performance levels of the internal factors. Highest performance was thought to be in the areas of ethical conduct, rigour (accuracy, credibility and reliability), relationship management of key clients, estimating ability and cost control ability. Areas of least strong performance were identified as effective human resource (people) management, international presence or connections (reach), and channels for capturing innovation and creativity.

Table 41: Rank Ordered Mean Performance Ratings of Internal Factors – All Respondents

| Internal Factor | n | m | s.d. | r | Interpretation |
|-------------------------|----|------|------|----|-------------------------|
| Ethical conduct | 77 | 0.82 | 0.35 | 1 | Outstanding performance |
| Rigour | 74 | 0.81 | 0.32 | 2 | Outstanding performance |
| Relationship management | 78 | 0.79 | 0.28 | 3 | High performance |
| Estimating ability | 78 | 0.78 | 0.38 | 4 | High performance |
| Cost control ability | 77 | 0.77 | 0.34 | 5 | High performance |
| Teamwork | 76 | 0.75 | 0.36 | 6 | High performance |
| Measurement ability | 78 | 0.74 | 0.41 | 7 | High performance |
| Work methods | 76 | 0.74 | 0.35 | 8 | High performance |
| Cost knowledge | 77 | 0.74 | 0.38 | 9 | High performance |
| Communication skill | 75 | 0.73 | 0.32 | 10 | High performance |
| Client quality | 78 | 0.73 | 0.31 | 11 | High performance |
| Networks | 77 | 0.72 | 0.34 | 12 | High performance |
| Interpersonal skill | 76 | 0.72 | 0.31 | 13 | High performance |
| Market awareness | 77 | 0.71 | 0.34 | 14 | High performance |
| Legal knowledge | 77 | 0.70 | 0.34 | 15 | High performance |
| Construction knowledge | 78 | 0.70 | 0.42 | 16 | High performance |
| Firm flexibility | 77 | 0.68 | 0.36 | 17 | High performance |
| Leadership | 76 | 0.68 | 0.38 | 18 | High performance |

| | | | | | |
|----------------------|----|------|------|----|------------------|
| Knowledge management | 76 | 0.68 | 0.40 | 18 | High performance |
| Strategic management | 77 | 0.68 | 0.35 | 20 | High performance |
| Training | 75 | 0.66 | 0.39 | 21 | High performance |
| IT systems | 75 | 0.65 | 0.38 | 22 | High performance |
| Brand | 78 | 0.64 | 0.41 | 23 | High performance |
| Innovation capture | 76 | 0.61 | 0.43 | 24 | High performance |
| International reach | 75 | 0.61 | 0.45 | 25 | High performance |
| People management | 76 | 0.61 | 0.40 | 26 | High performance |

5.2.8.2 *Difference of Perception Between NZIQS and non-NZIQS Respondents*

The table below identifies the statistically significant variances between the perceptions of NZIQS and non-NZIQS respondents regarding Internal Factor Performance. One Factor of disagreement was identified – ethical conduct.

Table 42: Internal Factor Performance – Difference of Perception Between NZIQS and non-NZIQS Respondents (Variances Only)

| Internal Factor Performance | NZIQS | | | | Non-NZIQS | | | | rank var. | U | p |
|--|-------|------|------|------|-----------|------|------|------|-----------|-----|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Ethical conduct | 39 | 0.87 | 0.17 | 1.00 | 38 | 0.77 | 0.23 | 5 | 4 | 552 | 0.039 |
| U = Mann-Whitney U p = 2-tailed Asymptotic Significance (p-value) | | | | | | | | | | | |

5.2.8.3 *Difference of Perception Between Emerging and Highly Experienced Respondents*

The table below identifies the statistically significant variances between the perceptions of emerging and highly experienced respondents regarding Internal Factor Performance. 14 Factors of disagreement were identified – communication skill, client quality, networks, brand, international reach, knowledge management, work methods, IT systems, training, innovation capture, estimating ability, cost knowledge, construction knowledge, and legal knowledge.

Table 43: Internal Factor Performance – Difference of Perception Between Emerging and Highly Experienced Respondents (Variances Only)

| Internal Factor Performance | Emerging Professionals | Senior Professionals | | U | p |
|-----------------------------|------------------------|----------------------|--|---|---|
|-----------------------------|------------------------|----------------------|--|---|---|

| | n | mean | s.d. | rank | n | mean | s.d. | rank | rank var. | | |
|--|----|------|------|-------|----|------|------|------|-----------|-------|-------|
| Communication skill | 25 | 0.82 | 0.16 | 4.00 | 50 | 0.69 | 0.19 | 10 | 6 | 389.5 | 0.005 |
| Client quality | 28 | 0.80 | 0.17 | 10.00 | 50 | 0.68 | 0.19 | 13 | 3 | 467.5 | 0.011 |
| Networks | 27 | 0.80 | 0.20 | 10.00 | 50 | 0.68 | 0.20 | 14 | 4 | 458.0 | 0.016 |
| Brand | 27 | 0.75 | 0.23 | 20.00 | 51 | 0.59 | 0.23 | 22 | 2 | 434.5 | 0.006 |
| International reach | 27 | 0.73 | 0.26 | 24.00 | 48 | 0.55 | 0.26 | 26 | 2 | 413.0 | 0.008 |
| Knowledge management | 26 | 0.78 | 0.22 | 15.00 | 50 | 0.62 | 0.23 | 20 | 5 | 417.5 | 0.008 |
| Work methods | 26 | 0.82 | 0.16 | 7.00 | 50 | 0.70 | 0.23 | 8 | 1 | 465.5 | 0.034 |
| IT systems | 25 | 0.77 | 0.20 | 17.00 | 50 | 0.59 | 0.22 | 23 | 6 | 363.0 | 0.002 |
| Training | 25 | 0.77 | 0.21 | 17.00 | 50 | 0.61 | 0.23 | 21 | 4 | 400.0 | 0.009 |
| Innovation capture | 26 | 0.74 | 0.24 | 21.00 | 50 | 0.55 | 0.24 | 25 | 4 | 381.5 | 0.003 |
| Estimating ability | 27 | 0.86 | 0.18 | 1.00 | 51 | 0.74 | 0.24 | 5 | 4 | 484.0 | 0.024 |
| Cost knowledge | 26 | 0.84 | 0.20 | 3.00 | 51 | 0.69 | 0.22 | 11 | 8 | 409.0 | 0.004 |
| Construction knowledge | 28 | 0.81 | 0.24 | 9.00 | 50 | 0.64 | 0.23 | 19 | 10 | 428.0 | 0.003 |
| Legal knowledge | 27 | 0.78 | 0.19 | 14.00 | 50 | 0.66 | 0.20 | 16 | 2 | 457.0 | 0.015 |
| U = Mann-Whitney U p = 2-tailed Asymptotic Significance (p-value) | | | | | | | | | | | |

5.2.8.4 Difference of Perception Between Consulting Quantity Surveyors and Others

No statistically significant variances were detected between the perceptions of consulting QS's and other respondents regarding Internal Factor Performance.

5.2.9 Correlation between the Depolarised Impacts of External Forces and the Importance of Internal Attributes

5.2.9.1 Correlation of External-Internal Factor Pairs

The Spearman's Rank Correlation Coefficient measures the strength of the relationship between every pairing of External Factor impact and Internal Factor importance rating. Qualifications and supply chain position are External Factors that each feature numerous times in a high-ranking relationship. Training, innovation capture, networks and legal knowledge are listed at least twice each on the Internal Factor side of the relationship. Overall, 129 of a possible 728 statistically significant relationships were identified (refer to Table 103 in Appendix I for the full list).

Table 44: Rank Ordered External Factor / Internal Factor Correlations – All Respondents (Top 20)

| External Factor Impact | Internal Factor Importance | Correlation Coefficient | Sig. (2-tailed) | Rank | No. of observations |
|------------------------|----------------------------|-------------------------|-----------------|------|---------------------|
| Qualifications | Training | 0.467 | 0.000 | 1 | 86 |
| International demand | Innovation capture | 0.427 | 0.000 | 2 | 78 |
| Qualifications | Networks | 0.422 | 0.000 | 3 | 86 |
| Private sector | Strategic management | 0.395 | 0.000 | 4 | 87 |
| Public sector | Cost knowledge | 0.393 | 0.000 | 5 | 87 |
| Qualifications | Innovation capture | 0.389 | 0.000 | 6 | 85 |
| Supply chain position | Training | 0.388 | 0.000 | 7 | 87 |
| IT substitutions | Work methods | 0.385 | 0.000 | 8 | 89 |
| Supply chain position | Interpersonal skill | 0.380 | 0.000 | 9 | 88 |
| Supply chain position | Networks | 0.375 | 0.000 | 10 | 87 |
| IT substitutions | Innovation capture | 0.372 | 0.000 | 11 | 88 |
| In-house QS | Firm flexibility | 0.372 | 0.000 | 12 | 88 |
| Private sector | Market awareness | 0.371 | 0.000 | 13 | 87 |
| Supply chain position | Legal knowledge | 0.361 | 0.001 | 14 | 88 |
| Contractor demand | Legal knowledge | 0.354 | 0.001 | 15 | 88 |
| IT substitutions | IT systems | 0.353 | 0.001 | 16 | 89 |
| Public sector | Market awareness | 0.351 | 0.001 | 17 | 86 |
| Supply chain position | Innovation capture | 0.348 | 0.001 | 18 | 86 |
| International demand | Cost control ability | 0.346 | 0.002 | 19 | 79 |
| Employment market | Training | 0.345 | 0.001 | 20 | 86 |

The table below provides qualitative interpretations for the correlation coefficients.

Table 45: Correlation Coefficient Interpretation Key

| Hinkle, Wiersma, and Jurs (2003) | | Saunders et al. (2016) | |
|----------------------------------|-------------------------------|-------------------------------|----------------------------|
| Correlation Coefficient Size | Correlation Interpretation | Correlation Coefficient Size | Correlation Interpretation |
| 0.90 to 1.00 (-0.90 to -1.00) | Very high positive (negative) | 1.00 (-1.00) | Perfect correlation |
| 0.70 to 0.90 (-0.70 to -0.90) | High positive (negative) | 0.80 to 1.00 (-0.80 to -1.00) | Very strong correlation |
| 0.50 to 0.70 (-0.50 to -0.70) | Moderate positive (negative) | 0.60 to 0.80 (-0.50 to -0.80) | Strong correlation |
| 0.30 to 0.50 (-0.30 to -0.50) | Low positive (negative) | 0.35 to 0.60 (-0.35 to -0.60) | Moderate correlation |
| 0.00 to 0.30 (0.00 to -0.30) | Negligible | 0.20 to 0.35 (-0.20 to -0.35) | Weak correlation |
| - | - | 0.00 to 0.20 (0.00 to -0.20) | No correlation |
| - | - | 0.00 | Perfect independence |

5.2.9.2 Total Correlations per External Factor

The table below presents the number of correlations, and the total value of those correlations as applicable to each External Factor. The External Factors with the strongest relationships with Internal

Factors are the supply chain position, IT substitutions, the level of public sector demand followed by private sector demand and then the quality of QS qualification offered by tertiary institutes.

Table 46: Total Correlations per External Factor

| External Factor | Correlation Coefficients Total | Correlation Coefficients Rank | Number of Correlations | Mean Correlation Coefficient |
|------------------------------|--------------------------------|-------------------------------|------------------------|------------------------------|
| Associated professions | 1.015 | 17 | 4 | 0.254 |
| Non-construction professions | 1.787 | 8 | 7 | 0.255 |
| Non-building | 0.000 | 23 | 0 | 0.000 |
| Other industries | 0.214 | 22 | 1 | 0.214 |
| Environmental services | 0.690 | 18 | 3 | 0.230 |
| Barriers to entry | 1.551 | 11 | 6 | 0.259 |
| IT substitutions | 3.278 | 2 | 11 | 0.298 |
| Non-traditional procurement | 0.000 | 23 | 0 | 0.000 |
| Lead consultants | 0.000 | 23 | 0 | 0.000 |
| In-house QS | 1.686 | 9 | 6 | 0.281 |
| Public cost data | 0.275 | 20 | 1 | 0.275 |
| Qualifications | 2.748 | 5 | 9 | 0.305 |
| Employment market | 1.489 | 12 | 5 | 0.298 |
| IT advances | 1.554 | 10 | 6 | 0.259 |
| Upstream information | 0.000 | 23 | 0 | 0.000 |
| Industry cycles | 1.070 | 15 | 4 | 0.268 |
| Private sector | 2.906 | 4 | 10 | 0.291 |
| Public sector | 3.228 | 3 | 11 | 0.293 |
| Associated professionals | 2.127 | 7 | 8 | 0.266 |
| Contractor demand | 1.199 | 13 | 4 | 0.300 |
| Supply chain position | 4.505 | 1 | 15 | 0.300 |
| International demand | 2.152 | 6 | 7 | 0.307 |
| Institute CPD | 0.506 | 19 | 2 | 0.253 |
| Institute profile | 0.000 | 23 | 0 | 0.000 |
| Professional collaboration | 1.065 | 16 | 4 | 0.266 |
| Price competition | 1.132 | 14 | 4 | 0.283 |
| Large firms | 0.000 | 23 | 0 | 0.000 |
| Profession lifecycle | 0.239 | 21 | 1 | 0.239 |

5.2.9.3 Total Correlations per Internal Factor

The table below presents the number of correlations, and the total value of those correlations as applicable to each Internal Factor. The Internal Factors with the strongest relationships with External Factors are legal knowledge, training, innovation capture, networks, and construction knowledge.

Table 47: Total Correlations per Internal Factor

| Internal Factor | Correlation Coefficients Total | Correlation Coefficients Rank | Number of Correlations | Mean Correlation Coefficient |
|-------------------------|--------------------------------|-------------------------------|------------------------|------------------------------|
| Leadership | 0.236 | 24 | 1 | 0.236 |
| Market awareness | 1.816 | 9 | 6 | 0.303 |
| Strategic management | 1.697 | 10 | 6 | 0.283 |
| Firm flexibility | 1.208 | 13 | 4 | 0.302 |
| People management | 0.248 | 23 | 1 | 0.248 |
| Interpersonal skill | 1.124 | 15 | 4 | 0.281 |
| Communication skill | 0.842 | 19 | 3 | 0.281 |
| Rigour | 0.214 | 25 | 1 | 0.214 |
| Teamwork | 0.478 | 22 | 2 | 0.239 |
| Ethical conduct | 0.744 | 20 | 3 | 0.248 |
| Relationship management | 0.000 | 26 | 0 | 0.000 |
| Client quality | 1.445 | 11 | 6 | 0.241 |
| Networks | 2.472 | 4 | 8 | 0.309 |
| Brand | 1.297 | 12 | 5 | 0.259 |
| International reach | 1.123 | 16 | 4 | 0.281 |
| Knowledge management | 1.049 | 17 | 4 | 0.262 |
| Work methods | 1.150 | 14 | 4 | 0.288 |
| IT systems | 2.068 | 8 | 7 | 0.295 |
| Training | 3.110 | 2 | 10 | 0.311 |
| Innovation capture | 2.827 | 3 | 9 | 0.314 |
| Measurement ability | 0.509 | 21 | 2 | 0.255 |
| Estimating ability | 0.946 | 18 | 4 | 0.237 |
| Cost control ability | 2.144 | 7 | 8 | 0.268 |
| Cost knowledge | 2.161 | 6 | 7 | 0.309 |
| Construction knowledge | 2.311 | 5 | 9 | 0.257 |
| Legal knowledge | 3.197 | 1 | 11 | 0.291 |

5.2.9.4 Comparison of Internal Factor Rank Order: Total Correlations Coefficient vs Importance Rating

The table below presents the Internal Factors ranked in terms of both their Importance rating and their total correlation coefficients. The biggest variance between the two ranking systems is for ‘rigour’ which is rated as second most important but only in 25th rank in terms of correlation coefficients. ‘Estimating ability’ and ‘ethical conduct’ and are ranked 1st and 3rd most important; but are both ranked 17 places lower in terms of correlation coefficients. On the other hand, ‘innovation capture’ is ranked 3rd in terms of correlation coefficients but only in 23rd place in terms of importance.

Table 48: Internal Factor Rank Order: Total Correlations Coefficient vs Importance Rating

| Internal Factor | Mean Importance score | Rank | Correlation Coefficients Total | Rank | Rank Variance |
|-------------------------|-----------------------|------|--------------------------------|------|---------------|
| Leadership | 0.78 | 21 | 0.236 | 24 | 3 |
| Market awareness | 0.82 | 17 | 1.816 | 9 | -8 |
| Strategic management | 0.77 | 22 | 1.697 | 10 | -12 |
| Firm flexibility | 0.83 | 14 | 1.208 | 13 | -1 |
| People management | 0.79 | 20 | 0.248 | 23 | 3 |
| Interpersonal skill | 0.85 | 9 | 1.124 | 15 | 6 |
| Communication skill | 0.88 | 5 | 0.842 | 19 | 14 |
| Rigour | 0.92 | 2 | 0.214 | 25 | 23 |
| Teamwork | 0.84 | 13 | 0.478 | 22 | 9 |
| Ethical conduct | 0.92 | 3 | 0.744 | 20 | 17 |
| Relationship management | 0.87 | 6 | 0 | 26 | 20 |
| Client quality | 0.8 | 19 | 1.445 | 11 | -8 |
| Networks | 0.82 | 15 | 2.472 | 4 | -11 |
| Brand | 0.74 | 24 | 1.297 | 12 | -12 |
| International reach | 0.65 | 26 | 1.123 | 16 | -10 |
| Knowledge management | 0.81 | 18 | 1.049 | 17 | -1 |
| Work methods | 0.84 | 12 | 1.15 | 14 | 2 |
| IT systems | 0.73 | 25 | 2.068 | 8 | -17 |
| Training | 0.84 | 11 | 3.11 | 2 | -9 |
| Innovation capture | 0.76 | 23 | 2.827 | 3 | -20 |
| Measurement ability | 0.86 | 7 | 0.509 | 21 | 14 |
| Estimating ability | 0.93 | 1 | 0.946 | 18 | 17 |
| Cost control ability | 0.89 | 4 | 2.144 | 7 | 3 |
| Cost knowledge | 0.85 | 8 | 2.161 | 6 | -2 |
| Construction knowledge | 0.84 | 10 | 2.311 | 5 | -5 |
| Legal knowledge | 0.82 | 16 | 3.197 | 1 | -15 |

5.3 Follow-up Observation Results

5.3.1 Outlier Identification and Removal

As with the original observation, outliers in the independent and dependent variables were investigated through both visual inspection of the data and analysis using SPSS. The results of the outlier identification process are outlined in the tables below.

Visual inspection did not identify any irregularities. SPSS identified 10 Extreme Values and a further 230 Outliers. Removal of Extreme Values amounted to between 1.6% and 2.4% of the data removed for each variable. Removal of Outliers as well would have constituted removal of up to 16.9% of the

data in extreme cases and of over 5% of the data in 17 (of 80) instances. In order to avoid excessive reduction in data points, only Extreme Values were removed. Overall, this resulted in only 10 of 7,118 (0.1%) data points being removed. The below table shows the ‘outliers’ and ‘extreme values’ identified in the External Factor data.

Table 49: Outlier Identification in External Factor Impact data

| External Factor | Total Resp | Identified Outliers | | | | | | |
|------------------------------|------------|---------------------|----------------|--|------|---|--|--------|
| | | Visual Inspection | Extreme Values | Total Visual Inspection & Extreme Values | | Outliers | Total Visual Inspection, Extreme Values & Outliers | |
| | | Resp. ID | Resp. ID | Number | % | Resp. ID | Number | % |
| Associated professions | 133 | . | . | - | 0.0% | . | - | 0.0% |
| Non-construction professions | 129 | . | . | - | 0.0% | . | - | 0.0% |
| Non-building | 131 | . | . | - | 0.0% | . | - | 0.0% |
| Other industries | 128 | . | . | - | 0.0% | . | - | 0.0% |
| Environmental services | 128 | . | . | - | 0.0% | . | - | 0.0% |
| Barriers to entry | 126 | . | . | - | 0.0% | . | - | 0.0% |
| IT substitutions | 133 | . | . | - | 0.0% | . | - | 0.0% |
| Non-traditional procurement | 131 | . | . | - | 0.0% | . | - | 0.0% |
| Lead consultants | 133 | . | 26, 49, 87 | 3 | 2.3% | 10, 25, 27, 29, 46, 53, 56, 69, 73, 96, 110, 128 | 15 | 11.3 % |
| In-house QS | 132 | . | . | - | 0.0% | . | - | 0.0% |
| Public cost data | 130 | . | . | - | 0.0% | 4, 6, 7, 9, 24, 25, 28, 49, 52, 54, 59, 66, 69, 70, 82, 87, 88, 89, 90, 97, 99, 125 | 22 | 16.9 % |
| Qualifications | 128 | . | . | - | 0.0% | . | - | 0.0% |
| Employment market | 132 | . | . | - | 0.0% | . | - | 0.0% |
| IT advances | 130 | . | . | - | 0.0% | 62, 68, 93 | 3 | 2.3% |
| Upstream information | 129 | . | . | - | 0.0% | . | - | 0.0% |
| Industry cycles | 128 | . | . | - | 0.0% | . | - | 0.0% |
| Private sector | 130 | . | . | - | 0.0% | . | - | 0.0% |
| Public sector | 129 | . | . | - | 0.0% | 11, 28, 50, 77 | - | 0.0% |

| | | | | | | | | |
|----------------------------|-------------|---|-------------|-----------|-------------|---|-----------|-------------|
| Associated professionals | 128 | . | 11, 28 | 2 | 1.6% | 19, 22, 31, 50, 68, 74, 77, 81, 104, 109, 118 | 13 | 10.2% |
| Contractor demand | 131 | . | 11, 28 | 2 | 1.5% | 19, 22, 24, 31, 36, 41, 50, 62, 74, 77, 78, 80, 81, 100, 104, 110, 118, 136 | 20 | 15.3% |
| Supply chain position | 127 | . | . | - | 0.0% | . | - | 0.0% |
| International demand | 123 | . | 62, 78, 119 | 3 | 2.4% | 22, 31, 57, 71, 74, 93, 97, 103, 104 | 12 | 9.8% |
| Institute CPD | 130 | . | . | - | 0.0% | . | - | 0.0% |
| Institute profile | 127 | . | . | - | 0.0% | . | - | 0.0% |
| Professional collaboration | 124 | . | . | - | 0.0% | . | - | 0.0% |
| Price competition | 128 | . | . | - | 0.0% | 77, 101 | 2 | 1.6% |
| Large firms | 129 | . | . | - | 0.0% | . | - | 0.0% |
| Profession lifecycle | 117 | . | . | - | 0.0% | . | - | 0.0% |
| Total | 3604 | - | - | 10 | 0.3% | - | 87 | 2.4% |

The below table shows the ‘outliers’ and ‘extreme values’ identified in the Internal Factor importance data.

Table 50: Outlier Identification in Internal Factor Importance data

| Internal Factor | Total Resp. | Identified Outliers | | | | | | |
|----------------------|-------------|---------------------|----------------|-----------------------------------|------|-----------------------|---|------|
| | | Visual Inspection | Extreme Values | Total Inspection & Extreme Values | | Outliers | Total Inspection, Extreme Values & Outliers | |
| | | Resp. ID | Resp. ID | Number | % | Resp. ID | Number | % |
| Leadership | 112 | . | . | - | 0.0% | 4, 80 | 2 | 1.8% |
| Market awareness | 114 | . | . | - | 0.0% | 4, 9, 23, 46, 61, 100 | 6 | 5.3% |
| Strategic management | 113 | . | . | - | 0.0% | . | - | 0.0% |
| Firm flexibility | 115 | . | . | - | 0.0% | . | - | 0.0% |
| People management | 115 | . | . | - | 0.0% | . | - | 0.0% |

| | | | | | | | | |
|-------------------------|-------------|---|---|----------|-------------|------------------------------------|-----------|-------------|
| Interpersonal skill | 118 | . | . | - | 0.0% | . | - | 0.0% |
| Communication skill | 117 | . | . | - | 0.0% | 4, 48 | 2 | 1.7% |
| Rigour | 117 | . | . | - | 0.0% | 10, 59 | 2 | 1.7% |
| Teamwork | 117 | . | . | - | 0.0% | 1, 10, 85, 100 | 4 | 3.4% |
| Ethical conduct | 116 | . | . | - | 0.0% | 4, 46, 92 | 3 | 2.6% |
| Relationship management | 117 | . | . | - | 0.0% | 9, 50, 52, 71, 96 | 5 | 4.3% |
| Client quality | 116 | . | . | - | 0.0% | . | - | 0.0% |
| Networks | 116 | . | . | - | 0.0% | . | - | 0.0% |
| Brand | 115 | . | . | - | 0.0% | 23, 27, 48, 74, 99, 100, 104 | 7 | 6.1% |
| International reach | 115 | . | . | - | 0.0% | . | - | 0.0% |
| Knowledge management | 116 | . | . | - | 0.0% | . | - | 0.0% |
| Work methods | 117 | . | . | - | 0.0% | 4, 100 | 2 | 1.7% |
| IT systems | 116 | . | . | - | 0.0% | . | - | 0.0% |
| Training | 117 | . | . | - | 0.0% | 24, 74, 92, 100 | 4 | 3.4% |
| Innovation capture | 115 | . | . | - | 0.0% | 96, 98 | 2 | 1.7% |
| Measurement ability | 117 | . | . | - | 0.0% | 2, 4, 5, 10, 46, 96, 103, 107, 115 | 9 | 7.7% |
| Estimating ability | 117 | . | . | - | 0.0% | 2, 96 | 2 | 1.7% |
| Cost control ability | 115 | . | . | - | 0.0% | 2, 13, 45 | 3 | 2.6% |
| Cost knowledge | 117 | . | . | - | 0.0% | 2, 69, 98 | 3 | 2.6% |
| Construction knowledge | 117 | . | . | - | 0.0% | 2, 23, 35, 76, 98, 99, 100 | 7 | 6.0% |
| Legal knowledge | 116 | . | . | - | 0.0% | 1, 2, 35, 36, 50, 54, 99, 100, 123 | 9 | 7.8% |
| Total | 3013 | - | - | 0 | 0.0% | - | 72 | 2.4% |

The below table shows the ‘outliers’ and ‘extreme values’ identified in the Internal Factor performance data.

Table 51: Outlier Identification in Internal Factor Performance data

| Internal Factor | Identified Outliers |
|-----------------|---------------------|
|-----------------|---------------------|

| | Total Resp. | Visual Inspection | Extreme Values | Total Visual Inspection & Extreme Values | | Outliers | Total Visual Inspection, Extreme Values & Outliers | |
|-------------------------|-------------|-------------------|----------------|--|------|---|--|-------|
| | | Resp. ID | Resp. ID | Number | % | Resp. ID | Number | % |
| Leadership | 104 | . | . | - | 0.0% | 26, 66, 100 | 3 | 2.9% |
| Market awareness | 101 | . | . | - | 0.0% | 26, 66, 71, 100 | 4 | 4.0% |
| Strategic management | 104 | . | . | - | 0.0% | . | - | 0.0% |
| Firm flexibility | 102 | . | . | - | 0.0% | . | - | 0.0% |
| People management | 105 | . | . | - | 0.0% | . | - | 0.0% |
| Interpersonal skill | 107 | . | . | - | 0.0% | 2, 4, 26, 28, 47, 71, 74, 90, 100 | 9 | 8.4% |
| Communication skill | 106 | . | . | - | 0.0% | 4, 26, 28, 52, 74, 100 | 6 | 5.7% |
| Rigour | 105 | . | . | - | 0.0% | . | - | 0.0% |
| Teamwork | 105 | . | . | - | 0.0% | 26, 40, 82, 96, 100, 118 | 6 | 5.7% |
| Ethical conduct | 104 | . | . | - | 0.0% | . | - | 0.0% |
| Relationship management | 101 | . | . | - | 0.0% | 19, 26, 96 | 3 | 3.0% |
| Client quality | 101 | . | . | - | 0.0% | 19, 26, 96, 103 | 4 | 4.0% |
| Networks | 103 | . | . | - | 0.0% | 2, 26, 52, 66, 103, 135 | 6 | 5.8% |
| Brand | 102 | . | . | - | 0.0% | . | - | 0.0% |
| International reach | 99 | . | . | - | 0.0% | . | - | 0.0% |
| Knowledge management | 99 | . | . | - | 0.0% | 1, 2, 26, 28, 52, 69, 71, 82, 106, 135 | 10 | 10.1% |
| Work methods | 100 | . | . | - | 0.0% | 2, 26, 135 | 3 | 3.0% |
| IT systems | 103 | . | . | - | 0.0% | . | - | 0.0% |
| Training | 102 | . | . | - | 0.0% | . | - | 0.0% |
| Innovation capture | 99 | . | . | - | 0.0% | . | - | 0.0% |
| Measurement ability | 105 | . | . | - | 0.0% | . | - | 0.0% |
| Estimating ability | 104 | . | . | - | 0.0% | 6, 26, 74, 100 | 4 | 3.8% |
| Cost control ability | 104 | . | . | - | 0.0% | 26, 96, 135 | 3 | 2.9% |
| Cost knowledge | 103 | . | . | - | 0.0% | 6, 26, 71, 82 | 4 | 3.9% |
| Construction knowledge | 106 | . | . | - | 0.0% | 1, 6, 26, 40, 71, 90, 96, 103, 133, 135 | 10 | 9.4% |

| | | | | | | | | |
|-----------------|-------------|---|---|----------|-------------|-------------------------------|-----------|-------------|
| Legal knowledge | 104 | . | . | - | 0.0% | 6, 26, 55, 74, 133, 135 | 6 | 5.8% |
| Total | 2678 | - | - | 0 | 0.0% | - | 81 | 3.0% |

5.3.2 Response Rate

As described in section 5.2.2, response rates for studies amongst the QS population are known to be low. Response rates from questionnaires administered to the NZIQS tend to be no higher than 5%.

Table 52: Questionnaire Response Rate

| Sampling Frame | Population | | | Effective Sampling Frame | | |
|----------------|-------------|-----------|--------------|--------------------------|-----------|--------------|
| | n | r | % | n | r | % |
| AIQS | 5380 | 23 | 0.43% | 2152 | 23 | 1.07% |
| NZIQS | 3927 | 75 | 1.91% | 1492 | 75 | 5.03% |
| Total | 9307 | 98 | 1.05% | 3644 | 98 | 2.69% |

5.3.3 Normality Checks

Visual inspection of the data plotted on histograms suggested that some of the variables tended toward a normal distribution whilst others were clearly not normally distributed. Nevertheless, the results of the Kolmogorov–Smirnov and the Shapiro-Wilk tests performed with SPSS both confirmed that overall the data was not normally distributed, and therefore better suited to non-parametric statistical techniques (refer to section 3.6.2.6 for further discussion on this). Refer to Table 104 through to and including Table 106 in Appendix J for the full results of the normality tests.

5.3.4 Respondent Demographics

5.3.4.1 Professional Institute Membership

Almost 70% of respondents were members of the AIQS or NZIQS. The largest group was the NZIQS at 53.3. The 29.9% of responses from ‘other’ is due to the informal sampling via the researcher’s own networks as described and the research methods.

Table 53: Respondent Demographics – Professional Institute

| Professional institute | count | rank | % | % |
|------------------------|------------|------|----------------|----------------|
| AIQS | 21 | 3 | 15.33% | 21.88% |
| NZIQS | 73 | 1 | 53.28% | 76.04% |
| AIQS & NZIQS | 2 | 4 | 1.46% | 2.08% |
| Other | 41 | 2 | 29.93% | excl |
| Total | 137 | | 100.00% | 100.00% |

5.3.4.2 Membership Grade

Table 54: Respondent Demographics – Membership Grade

The largest group of respondents (38%) were members or associates of a professional institute, followed by the junior membership grades (32.1%), then ‘unknown’ (16.8%) and senior ‘fellow’ or ‘life’ members (10.2%).

| Membership grade | count | rank | % | % |
|--|------------|------|----------------|----------------|
| Student / graduate / affiliate / probationer | 44 | 2 | 32.12% | 38.60% |
| Member / associate | 52 | 1 | 37.96% | 45.61% |
| Fellow / life member | 14 | 4 | 10.22% | 12.28% |
| Other | 4 | 5 | 2.92% | 3.51% |
| Unknown | 23 | 3 | 16.79% | excl |
| Total | 137 | | 100.00% | 100.00% |

5.3.4.3 *Years of Professional Experience*

By far the largest group represented were the highly experienced members with over 21 years or more experience (29.2%). Members with 11 years' experience or greater, accounted for over half of all respondents, reflecting the level of interest in the research, from senior members of the profession.

Table 55: Respondent Demographics – Years of Professional Experience

| Years of professional experience | count | rank | % | % |
|----------------------------------|------------|------|----------------|----------------|
| 0-5 years | 23 | 3 | 16.79% | 19.66% |
| 6-10 years | 24 | 2 | 17.52% | 20.51% |
| 11-15 years | 21 | 4 | 15.33% | 17.95% |
| 16-20 years | 9 | 6 | 6.57% | 7.69% |
| 21 years or more | 40 | 1 | 29.20% | 34.19% |
| Unknown | 20 | 5 | 14.60% | excl |
| Total | 137 | | 100.00% | 100.00% |

5.3.4.4 *Position in Organisation*

Again, the largest group of respondents were senior practitioners (28.5%) followed by the very senior managers and directors (21.9%) who, together made up over half of all respondents, or over 60% of all declared positions.

Table 56: Respondent Demographics – Position in Organisation

| Position in organisation | count | rank | % | % |
|--|------------|------|----------------|----------------|
| Cadet / junior professional | 17 | 4 | 12.41% | 14.91% |
| Intermediate professional | 17 | 4 | 12.41% | 14.91% |
| Senior professional / team lead / mid management | 39 | 1 | 28.47% | 34.21% |
| General manager / director / chief executive | 30 | 2 | 21.90% | 26.32% |
| Sole practitioner | 11 | 6 | 8.03% | 9.65% |
| Unknown | 23 | 3 | 16.79% | excl |
| Total | 137 | | 100.00% | 100.00% |

5.3.4.5 Organisation Type

Over half (54.2%) of all known respondents came from QS firms or diversified consultancies, the next biggest group being construction contractors or subcontractors (29.2%). The remaining respondents came from a mix of public or private institutions.

Table 57: Respondent Demographics – Organisation Type

| Organisation | count | rank | % | % |
|---|------------|------|----------------|----------------|
| Construction cost management consultancy | 46 | 1 | 33.58% | 42.99% |
| Diversified property services consultancy | 12 | 4 | 8.76% | 11.21% |
| Construction contractor or subcontractor | 40 | 2 | 29.20% | 37.38% |
| Client organisation | 3 | 6 | 2.19% | 2.80% |
| Bank or financier | 0 | 7 | 0.00% | 0.00% |
| Government (local/state/national) | 0 | 7 | 0.00% | 0.00% |
| Education provider | 6 | 5 | 4.38% | 5.61% |
| Unknown | 30 | 3 | 21.90% | excl |
| Total | 137 | | 100.00% | 100.00% |

5.3.4.6 Current Role

By far the largest group of respondents were quantity surveyors; 65% of all responses and close to 85% of all known responses; the next biggest group being project managers. Around 23% did not declare their current role.

Table 58: Respondent Demographics – Current Role

| Current role focus area | count | rank | % | % |
|--------------------------------|------------|------|----------------|----------------|
| Cost management | 89 | 1 | 64.96% | 84.76% |
| Project management | 12 | 3 | 8.76% | 11.43% |
| Facilities or asset management | 0 | 6 | 0.00% | 0.00% |
| Property development | 1 | 5 | 0.73% | 0.95% |
| Legal / dispute resolution | 3 | 4 | 2.19% | 2.86% |
| Unknown | 32 | 2 | 23.36% | excl |
| Total | 137 | | 100.00% | 100.00% |

5.3.5 External Factor Polarised Impacts

The table below presents the perceived likely impact ratings of external forces. The largest opportunities were thought to come from public sector (recognition and demand from), IT advances (advances that promise more efficient ways of working), and associated professionals (recognition and demand from). The largest threats were perceived to be price competition (QS firms who take a cost leadership approach to competing), lead consultants (architects or project manager who manage without QS involvement) and in-house QS's.

Table 59: Rank Ordered Mean Polarised Impact Ratings of External Factors – All Respondents

| External Factor | n | m | s.d. | r | Interpretation |
|------------------------------|-----|--------|------|----|------------------------------|
| Public sector | 129 | 0.56 | 0.48 | 1 | Small to medium opportunity |
| IT advances | 130 | 0.50 | 0.51 | 2 | Small to medium opportunity |
| Associated professionals | 126 | 0.48 | 0.42 | 3 | Small to medium opportunity |
| International demand | 120 | 0.45 | 0.40 | 4 | Small to medium opportunity |
| Contractor demand | 129 | 0.42 | 0.47 | 5 | Small to medium opportunity |
| Non-building | 131 | 0.42 | 0.47 | 6 | Small to medium opportunity |
| Environmental services | 128 | 0.38 | 0.46 | 7 | Small to medium opportunity |
| Private sector | 130 | 0.36 | 0.52 | 8 | Small to medium opportunity |
| Other industries | 128 | 0.33 | 0.43 | 9 | Neutral to small opportunity |
| Institute profile | 127 | 0.33 | 0.43 | 10 | Neutral to small opportunity |
| Supply chain position | 127 | 0.32 | 0.51 | 11 | Neutral to small opportunity |
| Institute CPD | 130 | 0.32 | 0.45 | 12 | Neutral to small opportunity |
| Professional collaboration | 124 | 0.24 | 0.48 | 13 | Neutral to small opportunity |
| IT substitutions | 133 | 0.20 | 0.67 | 14 | Neutral to small opportunity |
| Upstream information | 129 | 0.19 | 0.65 | 15 | Neutral to small opportunity |
| Employment market | 132 | 0.16 | 0.61 | 16 | Neutral to small opportunity |
| Qualifications | 128 | 0.13 | 0.59 | 17 | Neutral to small opportunity |
| Associated professions | 133 | 0.04 | 0.57 | 18 | Neutral to small opportunity |
| Barriers to entry | 126 | 0.04 | 0.50 | 19 | Neutral to small opportunity |
| Public cost data | 130 | - 0.04 | 0.47 | 20 | Neutral to small threat |
| Non-construction professions | 129 | - 0.05 | 0.51 | 21 | Neutral to small threat |
| Profession lifecycle | 117 | - 0.06 | 0.43 | 22 | Neutral to small threat |
| Industry cycles | 128 | - 0.10 | 0.52 | 23 | Neutral to small threat |
| Non-traditional procurement | 131 | - 0.17 | 0.51 | 24 | Neutral to small threat |
| Large firms | 129 | - 0.21 | 0.51 | 25 | Neutral to small threat |
| In-house QS | 132 | - 0.34 | 0.45 | 26 | Small to medium threat |
| Lead consultants | 130 | - 0.40 | 0.42 | 27 | Small to medium threat |
| Price competition | 128 | - 0.45 | 0.51 | 28 | Small to medium threat |

5.3.6 External Factor Depolarised Impacts

The table below presents the external factors that are thought to have the biggest impact on firms (whether positive or negative). The three most impactful factors were thought to be public sector, IT advances, and IT substitutions. The three factors of least concern were the current stage of the profession's lifecycle, publicly available cost data, and the barriers (or lack of) for new entrants to compete in the industry against the incumbent firms.

Table 60: Rank Ordered Mean Depolarised Impact Ratings of External Factors – All Respondents

| External Factor | n | m | s.d. | r | Interpretation |
|------------------------------|-----|------|------|----|-----------------|
| Public sector | 129 | 0.68 | 0.30 | 1 | High impact |
| IT advances | 130 | 0.64 | 0.32 | 2 | High impact |
| IT substitutions | 133 | 0.62 | 0.32 | 3 | High impact |
| Price competition | 128 | 0.60 | 0.32 | 4 | Moderate impact |
| Upstream information | 129 | 0.60 | 0.31 | 5 | Moderate impact |
| Associated professionals | 126 | 0.57 | 0.29 | 6 | Moderate impact |
| Private sector | 130 | 0.56 | 0.29 | 7 | Moderate impact |
| Employment market | 132 | 0.55 | 0.30 | 8 | Moderate impact |
| Contractor demand | 129 | 0.55 | 0.30 | 9 | Moderate impact |
| Qualifications | 128 | 0.52 | 0.31 | 10 | Moderate impact |
| Non-building | 131 | 0.51 | 0.36 | 11 | Moderate impact |
| International demand | 120 | 0.51 | 0.33 | 12 | Moderate impact |
| Supply chain position | 127 | 0.51 | 0.32 | 13 | Moderate impact |
| Lead consultants | 130 | 0.49 | 0.29 | 14 | Moderate impact |
| Associated professions | 133 | 0.49 | 0.28 | 15 | Moderate impact |
| Environmental services | 128 | 0.48 | 0.36 | 16 | Moderate impact |
| In-house QS | 132 | 0.47 | 0.32 | 17 | Moderate impact |
| Institute profile | 127 | 0.46 | 0.28 | 18 | Moderate impact |
| Large firms | 129 | 0.46 | 0.31 | 19 | Moderate impact |
| Institute CPD | 130 | 0.46 | 0.30 | 20 | Moderate impact |
| Non-traditional procurement | 131 | 0.46 | 0.28 | 21 | Moderate impact |
| Industry cycles | 128 | 0.45 | 0.28 | 22 | Moderate impact |
| Professional collaboration | 124 | 0.44 | 0.30 | 23 | Moderate impact |
| Other industries | 128 | 0.43 | 0.33 | 24 | Moderate impact |
| Non-construction professions | 129 | 0.41 | 0.31 | 25 | Low impact |
| Barriers to entry | 126 | 0.40 | 0.31 | 26 | Low impact |
| Public cost data | 130 | 0.34 | 0.33 | 27 | Low impact |
| Profession lifecycle | 117 | 0.32 | 0.28 | 28 | Low impact |

5.3.7 Internal Factor Importance

Following table presents importance rating of the internal factors. The most important internal factor was thought to be ethical conduct, followed by estimating ability, rigor in approach (accuracy, credibility and reliability), leadership of the firm, and relationship management of key clients. Considered to be of least importance were; the international reach of firms, Active marketing and brand promotion activities, and state of the art IT systems.

Table 61: Mean Importance Ratings of Internal Factors

| Internal Factor | n | m | s.d. | r | Interpretation |
|-------------------------|-----|------|------|----|----------------------|
| Ethical conduct | 116 | 0.91 | 0.15 | 1 | Extremely important |
| Estimating ability | 117 | 0.90 | 0.15 | 2 | Extremely important |
| Rigour | 117 | 0.90 | 0.15 | 3 | Extremely important |
| Leadership | 112 | 0.89 | 0.14 | 4 | Extremely important |
| Relationship management | 117 | 0.86 | 0.17 | 5 | Extremely important |
| Measurement ability | 117 | 0.85 | 0.20 | 6 | Extremely important |
| Communication skill | 117 | 0.85 | 0.15 | 7 | Extremely important |
| Cost control ability | 115 | 0.84 | 0.16 | 8 | Extremely important |
| Work methods | 117 | 0.84 | 0.15 | 9 | Extremely important |
| Cost knowledge | 117 | 0.84 | 0.18 | 10 | Extremely important |
| Training | 117 | 0.83 | 0.18 | 11 | Extremely important |
| Market awareness | 114 | 0.82 | 0.18 | 12 | Extremely important |
| Teamwork | 117 | 0.82 | 0.18 | 13 | Extremely important |
| Construction knowledge | 117 | 0.82 | 0.19 | 14 | Extremely important |
| Legal knowledge | 116 | 0.82 | 0.19 | 15 | Extremely important |
| Interpersonal skill | 118 | 0.81 | 0.19 | 16 | Extremely important |
| Client quality | 116 | 0.79 | 0.21 | 17 | Highly important |
| Networks | 116 | 0.79 | 0.19 | 18 | Highly important |
| Knowledge management | 116 | 0.78 | 0.18 | 19 | Highly important |
| Strategic management | 113 | 0.77 | 0.19 | 20 | Highly important |
| People management | 115 | 0.77 | 0.22 | 21 | Highly important |
| Firm flexibility | 115 | 0.76 | 0.21 | 22 | Highly important |
| Innovation capture | 115 | 0.74 | 0.20 | 23 | Highly important |
| IT systems | 116 | 0.73 | 0.22 | 24 | Highly important |
| Brand | 115 | 0.67 | 0.23 | 25 | Highly important |
| International reach | 115 | 0.58 | 0.25 | 26 | Moderately important |

5.3.8 Internal Factor Performance

The below table presents perceptions on performance levels of the internal factors. Highest performance was thought to be in the areas of rigour (accuracy, credibility and reliability), ethical conduct, measurement ability, estimating ability and cost knowledge. Areas of least strong performance were identified as marketing and brand promotion activities, channels for capturing innovation and creativity, and international presence or connections (reach).

Table 62: Mean Performance Ratings of Internal Factor

| External Factor | n | m | s.d. | r | Interpretation |
|-------------------------|-----|------|------|----|------------------|
| Rigour | 105 | 0.76 | 0.21 | 1 | High performance |
| Ethical conduct | 104 | 0.75 | 0.22 | 2 | High performance |
| Measurement ability | 105 | 0.75 | 0.23 | 3 | High performance |
| Estimating ability | 104 | 0.74 | 0.19 | 4 | High performance |
| Cost knowledge | 103 | 0.73 | 0.22 | 5 | High performance |
| Relationship management | 101 | 0.72 | 0.20 | 6 | High performance |
| Cost control ability | 104 | 0.71 | 0.20 | 7 | High performance |
| Work methods | 100 | 0.71 | 0.20 | 8 | High performance |
| Communication skill | 106 | 0.70 | 0.23 | 9 | High performance |
| Leadership | 104 | 0.70 | 0.21 | 10 | High performance |
| Client quality | 101 | 0.69 | 0.21 | 11 | High performance |
| Legal knowledge | 104 | 0.69 | 0.23 | 12 | High performance |
| Networks | 103 | 0.69 | 0.21 | 13 | High performance |
| Interpersonal skill | 107 | 0.67 | 0.23 | 14 | High performance |
| Teamwork | 105 | 0.67 | 0.23 | 15 | High performance |
| Market awareness | 101 | 0.67 | 0.20 | 16 | High performance |
| Knowledge management | 99 | 0.66 | 0.24 | 17 | High performance |
| Construction knowledge | 106 | 0.66 | 0.25 | 18 | High performance |
| Training | 102 | 0.62 | 0.24 | 19 | High performance |
| Strategic management | 104 | 0.62 | 0.22 | 20 | High performance |
| People management | 105 | 0.62 | 0.23 | 21 | High performance |
| IT systems | 103 | 0.61 | 0.25 | 22 | Good performance |
| Firm flexibility | 102 | 0.60 | 0.25 | 23 | Good performance |
| International reach | 99 | 0.57 | 0.25 | 24 | Good performance |
| Innovation capture | 99 | 0.56 | 0.26 | 25 | Good performance |
| Brand | 102 | 0.55 | 0.24 | 26 | Good performance |

5.3.9 Correlation between the Depolarised Impacts of External Forces and the Importance of Internal Attributes

As discussed in section 5.2.9, depolarised impacts ratings were selected as the appropriate variable for testing correlation with Internal Factors' importance.

5.3.9.1 Correlation of External-Internal Factor Pairs

The following table presents the top 20 correlations between pairs of external and internal factors, based on relative levels of impact and importance. Of note is that international demand and IT substitutions feature a number of times as external impacts. On the other hand, the Internal Factors of innovation capture, training, IT systems, and leadership each feature at least twice. Overall, 129 of a possible 728 statistically significant relationships were identified (refer to

Table 107 in Appendix K for the full list).

Table 63: External and Internal Factor Correlations – All Respondents (Top 20)

| External Factor Impact | Internal Factor Importance | Correlation Coefficient | Sig. (2-tailed) | Rank | No. of observations |
|-----------------------------|----------------------------|-------------------------|-----------------|------|---------------------|
| International demand | International reach | 0.409 | 0.000 | 1 | 106 |
| International demand | Cost knowledge | 0.368 | 0.000 | 2 | 106 |
| IT substitutions | Innovation capture | 0.340 | 0.000 | 3 | 112 |
| Associated professionals | Cost knowledge | 0.337 | 0.000 | 4 | 109 |
| Supply chain position | Strategic management | 0.335 | 0.000 | 5 | 107 |
| Private sector | Work methods | 0.329 | 0.000 | 6 | 113 |
| Institute CPD | Training | 0.326 | 0.000 | 7 | 113 |
| Contractor demand | Work methods | 0.309 | 0.001 | 8 | 112 |
| Employment market | People management | 0.309 | 0.001 | 9 | 113 |
| IT substitutions | Training | 0.305 | 0.001 | 10 | 114 |
| IT advances | Innovation capture | 0.304 | 0.001 | 11 | 112 |
| Associated professionals | Construction knowledge | 0.301 | 0.001 | 12 | 109 |
| Barriers to entry | Leadership | 0.300 | 0.002 | 13 | 106 |
| Barriers to entry | Leadership | 0.300 | 0.002 | 13 | 106 |
| Non-traditional procurement | IT systems | 0.298 | 0.001 | 15 | 112 |
| Employment market | Training | 0.295 | 0.001 | 16 | 114 |
| Supply chain position | Work methods | 0.295 | 0.002 | 17 | 110 |
| Non-traditional procurement | Ethical conduct | 0.294 | 0.002 | 18 | 112 |
| Large firms | Estimating ability | 0.290 | 0.002 | 20 | 112 |
| Public cost data | IT systems | 0.289 | 0.002 | 21 | 112 |

The table below provides an indicative interpretation key for the correlation coefficients.

Table 64: Correlation Coefficient Interpretation Key

| Hinkle et al. (2003) | | Saunders et al. (2016) | |
|-------------------------------|-------------------------------|-------------------------------|----------------------------|
| Correlation Coefficient Size | Correlation Interpretation | Correlation Coefficient Size | Correlation Interpretation |
| 0.90 to 1.00 (-0.90 to -1.00) | Very high positive (negative) | 1.00 (-1.00) | Perfect correlation |
| 0.70 to 0.90 (-0.70 to -0.90) | High positive (negative) | 0.80 to 1.00 (-0.80 to -1.00) | Very strong correlation |
| 0.50 to 0.70 (-0.50 to -0.70) | Moderate positive (negative) | 0.60 to 0.80 (-0.50 to -0.80) | Strong correlation |
| 0.30 to 0.50 (-0.30 to -0.50) | Low positive (negative) | 0.35 to 0.60 (-0.35 to -0.60) | Moderate correlation |
| 0.00 to 0.30 (0.00 to -0.30) | Negligible | 0.20 to 0.35 (-0.20 to -0.35) | Weak correlation |
| - | - | 0.00 to 0.20 (0.00 to -0.20) | No correlation |
| - | - | 0.00 | Perfect independence |

5.3.9.2 Total Correlations per External Factor

The table below presents the number of correlations, and the total value of those correlations as applicable to each External Factor. The External Factors with the strongest relationships with Internal Factors are the level of recognition and demand from the private sector, international demand, supply chain position, and the increasing number of large firms.

Table 65: Total Correlations per External Factor

| External Factor | Correlation Coefficients Total | Correlation Coefficients Rank | Number of Correlations | Mean Correlation Coefficient |
|------------------------------|--------------------------------|-------------------------------|------------------------|------------------------------|
| Associated professions | 0.412 | 25 | 2 | 0.206 |
| Non-construction professions | - | 26 | 0 | - |
| Non-building | 0.918 | 18 | 4 | 0.229 |
| Other industries | - | 26 | 0 | - |
| Environmental services | - | 26 | 0 | - |
| Barriers to entry | 0.531 | 22 | 2 | 0.266 |
| IT substitutions | 1.491 | 9 | 6 | 0.248 |
| Non-traditional procurement | 1.685 | 6 | 8 | 0.211 |
| Lead consultants | 1.428 | 10 | 6 | 0.238 |
| In-house QS | 1.525 | 7 | 8 | 0.191 |
| Public cost data | 0.683 | 20 | 3 | 0.228 |
| Qualifications | 1.023 | 16 | 4 | 0.256 |
| Employment market | 0.987 | 17 | 4 | 0.247 |
| IT advances | 1.397 | 11 | 6 | 0.233 |
| Upstream information | 0.782 | 19 | 4 | 0.196 |
| Industry cycles | 0.421 | 24 | 2 | 0.211 |
| Private sector | 2.453 | 1 | 10 | 0.245 |
| Public sector | 1.374 | 12 | 6 | 0.229 |
| Associated professionals | 1.524 | 8 | 6 | 0.254 |
| Contractor demand | 1.787 | 5 | 8 | 0.223 |
| Supply chain position | 2.002 | 3 | 8 | 0.250 |
| International demand | 2.424 | 2 | 9 | 0.269 |
| Institute CPD | 1.145 | 15 | 5 | 0.229 |
| Institute profile | 1.327 | 13 | 6 | 0.221 |
| Professional collaboration | 0.626 | 21 | 3 | 0.209 |
| Price competition | 0.477 | 23 | 2 | 0.239 |
| Large firms | 1.979 | 4 | 9 | 0.220 |
| Profession lifecycle | 1.229 | 14 | 5 | 0.246 |

5.3.9.3 *Total Correlations per Internal Factor*

The table below presents the number of correlations, and the total value of those correlations as applicable to each Internal Factor. The Internal Factors with the strongest relationships with External Factors are the training and upskilling initiatives, channels for capturing innovation and creativity, and the ability of firms to formulate and implement strategic options.

Table 66: Total Correlations per Internal Factor

| Internal Factor | Correlation Coefficients Total | Correlation Coefficients Rank | Number of Correlations | Mean Correlation Coefficient |
|-------------------------|--------------------------------|-------------------------------|------------------------|------------------------------|
| Leadership | 1.760 | 7 | 7 | 0.251 |
| Market awareness | 1.780 | 6 | 8 | 0.222 |
| Strategic management | 2.389 | 3 | 11 | 0.217 |
| Firm flexibility | 0.823 | 15 | 4 | 0.206 |
| People management | 2.292 | 4 | 11 | 0.208 |
| Interpersonal skill | 0.635 | 19 | 3 | 0.212 |
| Communication skill | 0.610 | 21 | 3 | 0.203 |
| Rigour | 0.194 | 26 | 1 | 0.194 |
| Teamwork | 0.347 | 24 | 2 | 0.174 |
| Ethical conduct | 0.897 | 12 | 4 | 0.224 |
| Relationship management | 0.382 | 23 | 2 | 0.191 |
| Client quality | 0.673 | 17 | 3 | 0.224 |
| Networks | 0.459 | 22 | 3 | 0.153 |
| Brand | 1.402 | 10 | 6 | 0.234 |
| International reach | 1.005 | 11 | 4 | 0.251 |
| Knowledge management | 0.668 | 18 | 4 | 0.167 |
| Work methods | 1.855 | 5 | 8 | 0.232 |
| IT systems | 1.440 | 9 | 6 | 0.240 |
| Training | 3.490 | 1 | 13 | 0.268 |
| Innovation capture | 2.609 | 2 | 11 | 0.237 |
| Measurement ability | 0.883 | 14 | 4 | 0.221 |
| Estimating ability | 0.886 | 13 | 4 | 0.222 |
| Cost control ability | 0.315 | 25 | 2 | 0.157 |
| Cost knowledge | 1.566 | 8 | 6 | 0.261 |
| Construction knowledge | 0.735 | 16 | 3 | 0.245 |
| Legal knowledge | 0.616 | 20 | 3 | 0.205 |

5.4 Comparison Between Original and Follow-up Observations' Data

5.4.1 Change in External Factor Depolarised Impact

Table 67 presents and compares the Original and Follow-up Observations' mean External Force impact scores.

Table 67: Change in External Factor Depolarised Impact

| External Factor | Original Observation | | | Follow-up Observation | | | Change | | | | |
|------------------------------|----------------------|--------------------------|----|-----------------------|--------------------------|----|--------|------------------|-----|------|-------|
| | n | m _{EFi} (sd) | r | n | m _{EFi} (sd) | r | n | m _{EFi} | r | U | p |
| Associated professions | 103 | .53(.32) | 6 | 133 | .49(.28) | 15 | 30 | -7% | -9 | 6335 | 0.296 |
| Non-construction professions | 102 | .40(.32) | 25 | 129 | .41(.31) | 25 | 27 | 3% | 0 | 6416 | 0.733 |
| Non-building | 93 | .56(.34) | 5 | 131 | .51(.36) | 12 | 38 | -8% | -7 | 5625 | 0.312 |
| Other industries | 98 | .50(.36) | 14 | 128 | .43(.33) | 24 | 30 | -14% | -10 | 5604 | 0.155 |
| Environmental services | 96 | .52(.33) | 9 | 128 | .48(.36) | 16 | 32 | -8% | -7 | 5731 | 0.373 |
| Barriers to entry | 98 | .38(.33) | 26 | 126 | .40(.31) | 26 | 28 | 5% | 0 | 5921 | 0.581 |
| IT substitutions | 101 | .59(.30) | 3 | 133 | .62(.32) | 3 | 32 | 5% | 0 | 6332 | 0.432 |
| Non-traditional procurement | 101 | .49(.34) | 16 | 131 | .46(.28) | 21 | 30 | -6% | -5 | 6248 | 0.444 |
| Lead consultants | 102 | .56(.33) | 4 | 133 | .51(.30) | 14 | 31 | -9% | -10 | 6160 | 0.205 |
| In-house QS | 101 | .51(.33) | 11 | 132 | .47(.32) | 17 | 31 | -8% | -6 | 6226 | 0.363 |
| Public cost data | 99 | .35(.34) | 28 | 130 | .34(.33) | 27 | 31 | -3% | 1 | 6316 | 0.800 |
| Qualifications | 96 | .48(.35) | 18 | 128 | .52(.31) | 11 | 32 | 7% | 7 | 5700 | 0.332 |
| Employment market | 97 | .62(.30) | 2 | 132 | .55(.30) | 9 | 35 | -10% | -7 | 5658 | 0.114 |
| IT advances (*) | 97 | .53(.31) | 8 | 130 | .64(.32) | 2 | 33 | 21% | 6 | 5042 | 0.007 |
| Upstream information (*) | 98 | .41(.34) | 24 | 129 | .60(.31) | 5 | 31 | 45% | 19 | 4398 | 0.000 |
| Industry cycles | 97 | .44(.35) | 22 | 128 | .45(.28) | 22 | 31 | 2% | 0 | 5988 | 0.632 |
| Private sector | 96 | .51(.29) | 12 | 130 | .56(.29) | 8 | 34 | 9% | 4 | 5808 | 0.346 |
| Public sector (*) | 95 | .53(.29) | 7 | 129 | .68(.30) | 1 | 34 | 27% | 6 | 4513 | 0.000 |
| Associated professionals (*) | 97 | .49(.32) | 17 | 128 | .58(.29) | 6 | 31 | 19% | 11 | 5216 | 0.031 |
| Contractor demand (*) | 97 | .46(.33) | 21 | 131 | .56(.31) | 7 | 34 | 22% | 14 | 5279 | 0.023 |
| Supply chain position | 96 | .52(.35) | 9 | 127 | .51(.32) | 13 | 31 | -2% | -4 | 5967 | 0.778 |
| International demand | 88 | .51(.35) | 13 | 123 | .52(.33) | 10 | 35 | 2% | 3 | 5319 | 0.824 |
| Institute CPD | 96 | .47(.33) | 19 | 130 | .46(.30) | 20 | 34 | -2% | -1 | 6193 | 0.918 |
| Institute profile | 94 | .49(.32) | 15 | 127 | .46(.29) | 18 | 33 | -6% | -3 | 5593 | 0.395 |
| Professional collaboration | 92 | .47(.34) | 20 | 124 | .44(.30) | 23 | 32 | -5% | -3 | 5520 | 0.668 |
| Price competition | 95 | .65(.31) | 1 | 128 | .60(.32) | 4 | 33 | -7% | -3 | 5557 | 0.250 |
| Large firms | 95 | .43(.34) | 23 | 129 | .46(.31) | 19 | 34 | 6% | 4 | 5761 | 0.421 |
| Profession lifecycle | 93 | .37(.33) | 27 | 117 | .32(.28) | 28 | 24 | -11% | -1 | 5116 | 0.430 |

| | | |
|---------------|---|---|
| n | = | <i>number of responses</i> |
| $m_{EFi}(sd)$ | = | <i>mean External Factor impact score (standard deviation)</i> |
| r | = | <i>rank</i> |
| U | = | <i>Mann-Whitney U</i> |
| p | = | <i>2-tailed Asymptotic Significance (p-value)</i> |
| (*) | = | <i>significant at an alpha level of 0.050</i> |

To enable the presentation of meaningfully interpretable force impact scores, means (and standard deviations) were rescaled after analysis of the coded data. The qualitative interpretation bands for the rescaled values are given in Table 68 below.

Table 68 External Factor mean impact score interpretation

| Rating | Interpretation |
|--------------|-------------------|
| 0.00 to 0.20 | Negligible impact |
| 0.21 to 0.40 | Slight impact |
| 0.41 to 0.60 | Moderate impact |
| 0.61 to 0.80 | High impact |
| 0.81 to 1.00 | Extreme impact |

In the Original Observation data, all External Factors have a $m_{\bar{r}}$ score in the 35th percentile or higher. Four are in the ‘slight impact’ band, two are in the ‘high impact’ band. The largest category by far is ‘moderate impact’ containing 20 Factors. The three most impactful Factors are ‘price competition,’ ‘employment market’ and ‘IT substitutions.’ The four Factors in the ‘slight impact’ band are ‘public cost data,’ ‘profession lifecycle,’ ‘barriers to entry,’ and ‘non-construction professions,’ in ascending order of impact.

In 2020, all Factors have a $m_{\bar{r}}$ percentile score of 32 or higher. Only three each fall within the ‘slight impact’ and ‘high impact’ bands. The largest category remains ‘moderate impact’ with 20 Forces. ‘IT substitutions’ remains one of the top three most impactful forces, joined by ‘public sector’ and ‘IT advances in first and second place respectively. The three ‘slight impact’ Factors are ‘profession lifecycle,’ ‘public cost data’ and ‘barriers to entry,’ in ascending order of impact.

There are numerous changes between the two rounds of data gathering. Six of the Factors' m_{Fi} score increased or decreased over 20%, 16 changed between 5% and 20% and only six Factors' scores changed less than 5%. The greatest change was 'upstream information' which increased by 45%. 'IT advances,' 'contractor demand' and 'public sector' rose by 21%, 22% and 28% respectively. Half of all Factors changed in rank by 5 positions or more. The most significant movement was 'upstream information' which moved 19 positions followed by 'contractor demand' and 'associated professionals' which gained 14 and 11 places respectively. One Factor, 'non-construction professions,' moved from 'slight impact' to 'moderate impact,' though its overall rank remained unchanged.

Results of the Mann-Whitney U test indicate that all of the major changes noted above ('upstream information,' 'public sector,' 'contractor demand,' 'IT advances' and 'associated professionals' are statistically significant to a pre-defined alpha of 0.05.

5.4.2 Change in Internal Factor Importance

Table 69 presents and compares the Original and Follow-up Observations' Internal Factor mean importance scores.

Table 69: Change in Internal Factor Importance

| Internal Factor | Original Observation | | | Follow-up Observation | | | Change | | | | |
|----------------------|----------------------|------------------|----|-----------------------|------------------|----|--------|----------|----|------|-------|
| | n | m_{Fi} (sd) | r | n | m_{Fi} (sd) | r | n | m_{Fi} | r | U | p |
| Leadership (*) | 89 | .78(.25) | 21 | 112 | .89(.14) | 4 | 23 | 14% | 17 | 3740 | 0.001 |
| Market awareness | 89 | .82(.20) | 17 | 114 | .82(.18) | 12 | 25 | 1% | 5 | 5036 | 0.923 |
| Strategic management | 90 | .77(.18) | 22 | 113 | .77(.19) | 20 | 23 | -1% | 2 | 5042 | 0.911 |
| Firm flexibility (*) | 88 | .83(.18) | 14 | 115 | .76(.21) | 22 | 27 | -9% | -8 | 4129 | 0.018 |
| People management | 88 | .79(.17) | 20 | 115 | .77(.22) | 21 | 27 | -3% | -1 | 4899 | 0.683 |
| Interpersonal skill | 90 | .85(.16) | 9 | 118 | .81(.19) | 16 | 28 | -5% | -7 | 4706 | 0.134 |
| Communication skill | 90 | .88(.13) | 5 | 117 | .85(.15) | 7 | 27 | -4% | -2 | 4690 | 0.140 |
| Rigour | 90 | .92(.13) | 2 | 117 | .90(.15) | 2 | 27 | -3% | 0 | 4803 | 0.194 |

| | | | | | | | | | | | |
|----------------------------|----|---|----|-----|----------|----|----|------|----|------|-------|
| Teamwork | 90 | .84(.17) | 13 | 117 | .82(.18) | 13 | 27 | -2% | 0 | 5064 | 0.615 |
| Ethical conduct | 91 | .92(.14) | 3 | 116 | .91(.15) | 1 | 25 | -2% | 2 | 4971 | 0.377 |
| Relationship management | 91 | .87(.14) | 6 | 117 | .86(.17) | 5 | 26 | -1% | 1 | 5256 | 0.863 |
| Client quality | 90 | .80(.19) | 19 | 116 | .79(.21) | 17 | 26 | -1% | 2 | 5186 | 0.932 |
| Networks | 89 | .82(.17) | 15 | 116 | .79(.19) | 18 | 27 | -4% | -3 | 4677 | 0.223 |
| Brand (*) | 90 | .74(.19) | 24 | 115 | .67(.24) | 25 | 25 | -9% | -1 | 4376 | 0.048 |
| International reach | 90 | .65(.27) | 26 | 115 | .58(.25) | 26 | 25 | -10% | 0 | 4443 | 0.074 |
| Knowledge management | 89 | .81(.18) | 18 | 116 | .78(.18) | 19 | 27 | -4% | -1 | 4652 | 0.200 |
| Work methods | 89 | .84(.17) | 12 | 117 | .84(.15) | 9 | 28 | 1% | 3 | 5173 | 0.932 |
| IT systems | 90 | .73(.21) | 25 | 116 | .73(.22) | 24 | 26 | 0% | 1 | 5186 | 0.933 |
| Training | 89 | .84(.17) | 11 | 117 | .83(.18) | 11 | 28 | -1% | 0 | 5094 | 0.775 |
| Innovation capture | 88 | .76(.20) | 23 | 115 | .74(.20) | 23 | 27 | -2% | 0 | 4772 | 0.466 |
| Measurement ability | 90 | .86(.17) | 7 | 117 | .85(.20) | 6 | 27 | 0% | 1 | 5166 | 0.799 |
| Estimating ability | 91 | .93(.13) | 1 | 117 | .90(.15) | 2 | 26 | -4% | -1 | 4695 | 0.078 |
| Cost control ability (*) | 89 | .89(.15) | 4 | 115 | .84(.16) | 8 | 26 | -5% | -4 | 4227 | 0.019 |
| Cost knowledge | 90 | .85(.16) | 8 | 117 | .84(.18) | 9 | 27 | -1% | -1 | 5190 | 0.848 |
| Construction knowledge | 90 | .84(.19) | 10 | 117 | .82(.20) | 14 | 27 | -3% | -4 | 4919 | 0.386 |
| Legal knowledge | 90 | .82(.18) | 16 | 116 | .82(.19) | 15 | 26 | -1% | 1 | 5215 | 0.990 |
| <i>n</i> | = | <i>number of responses</i> | | | | | | | | | |
| <i>m_{IFi}(sd)</i> | = | <i>mean Internal Factor importance score (standard deviation)</i> | | | | | | | | | |
| <i>r</i> | = | <i>rank</i> | | | | | | | | | |
| <i>U</i> | = | <i>Mann-Whitney U</i> | | | | | | | | | |
| <i>p</i> | = | <i>2-tailed Asymptotic Significance (p-value)</i> | | | | | | | | | |
| (*) | = | <i>significant at an alpha level of 0.050</i> | | | | | | | | | |

As with External Factor impact scores, the mean Internal Factor importance scores and standard deviations presented were rescaled for meaningful interpretation after analysis. The qualitative interpretation bands for the rescaled values are given in Table 70 below.

Table 70: Internal Factor mean importance score interpretation

| Rating | Interpretation |
|--------------|-----------------------|
| 0.00 to 0.20 | Negligible importance |
| 0.21 to 0.40 | Slight importance |
| 0.41 to 0.60 | Moderate importance |
| 0.61 to 0.80 | High importance |
| 0.81 to 1.00 | Extreme importance |

In the Original Observation data, all the Internal Factors have a m_{ai} score in the 65th percentile or higher. Eight are in the 'high importance' category and the remaining 18 in the 'extreme importance'

category. The three highest important Internal Factors are 'estimating ability,' followed by 'rigour' and 'ethical conduct.'

In the Follow-up Observation, all Internal Factors have an m_{ai} percentile score of 58 or higher. The lowest-ranked Internal Factors (international reach) was the only one to fall into the 'moderate importance' category. Of the remainder, nine are 'high importance,' and 16 are in the 'extreme importance' category. The three most important Internal Factors remain the same as for the Original Observation, although the ranking is slightly changed with 'ethical conduct' ranked in first place.

The main changes between the two rounds of data gathering were to the 'leadership' and 'firm flexibility' Factors. The importance of 'leadership' increased by 14%, climbing from 21st to 4th place. On the other hand, 'firm flexibility' decreased in importance by 9%, falling from 14th to 22nd place. Changes to the remaining Factors' m_{ai} scores are negligible, constituting a change in rank of five positions or less.

Results of the Mann-Whitney U test indicate that the changes in the perceived importance of 'leadership' and 'firm flexibility' are statistically significant to a pre-defined alpha of 0.05 – as are the smaller changes seen to 'brand' and 'cost control ability'.

5.4.3 Change in Internal Factor Performance

Table 71 presents and compares the Original and Follow-up Observations' Internal Factor mean importance scores. Statistically significant changes were found to occur and the factors of teamwork, ethical conduct, relationship management, marketing and brand promotion, and cost control ability. Most of these changes in level of performance were only minor. The main significant change was to teamwork which fell 9 places in terms of relative level of performance.

Table 71: Change in Internal Factor Performance

| Internal Factor | Original Observation | | | Follow-up Observation | | | Change | | | | |
|-----------------------------|----------------------|--|----|-----------------------|-----------------------|----|--------|-----------------------|----|------|-------|
| | n | m _{IFP} (sd) | r | n | m _{IFP} (sd) | r | n | m _{IFP} (sd) | r | U | p |
| Leadership | 76 | 0.68(.38) | 18 | 104 | 0.70(0.21) | 10 | 28 | 0.02 | -8 | 3795 | 0.637 |
| Market awareness | 77 | 0.71(.34) | 14 | 101 | 0.67(0.20) | 16 | 24 | -0.04 | 2 | 3409 | 0.139 |
| Strategic management | 77 | 0.68(.35) | 20 | 104 | 0.62(0.22) | 20 | 27 | -0.06 | 0 | 3499 | 0.133 |
| Firm flexibility | 77 | 0.68(.36) | 17 | 102 | 0.60(0.25) | 23 | 25 | -0.08 | 6 | 3295 | 0.058 |
| People management | 76 | 0.61(.40) | 26 | 105 | 0.62(0.23) | 21 | 29 | 0.01 | -5 | 3909 | 0.810 |
| Interpersonal skill | 76 | 0.72(.31) | 13 | 107 | 0.67(0.23) | 14 | 31 | -0.05 | 1 | 3560 | 0.134 |
| Communication skill | 75 | 0.73(.32) | 10 | 106 | 0.70(0.23) | 9 | 31 | -0.03 | -1 | 3697 | 0.402 |
| Rigour | 74 | 0.81(.32) | 2 | 105 | 0.76(0.21) | 1 | 31 | -0.05 | -1 | 3397 | 0.133 |
| Teamwork (*) | 76 | 0.75(.36) | 6 | 105 | 0.67(0.23) | 15 | 29 | -0.08 | 9 | 3121 | 0.010 |
| Ethical conduct (*) | 77 | 0.82(.35) | 1 | 104 | 0.75(0.22) | 2 | 27 | -0.07 | 1 | 3224 | 0.019 |
| Relationship management (*) | 78 | 0.79(.28) | 3 | 101 | 0.72(0.20) | 6 | 23 | -0.07 | 3 | 3132 | 0.013 |
| Client quality | 78 | 0.73(.31) | 11 | 101 | 0.69(0.21) | 11 | 23 | -0.04 | 0 | 3567 | 0.256 |
| Networks | 77 | 0.72(.32) | 12 | 103 | 0.69(0.21) | 13 | 26 | -0.03 | 1 | 3680 | 0.388 |
| Brand (*) | 78 | 0.64(.41) | 23 | 102 | 0.55(0.24) | 26 | 24 | -0.09 | 3 | 3103 | 0.009 |
| International reach | 75 | 0.61(.45) | 25 | 99 | 0.57(0.25) | 24 | 24 | -0.04 | -1 | 3374 | 0.290 |
| Knowledge management | 76 | 0.68(.40) | 18 | 99 | 0.66(0.24) | 17 | 23 | -0.02 | -1 | 3619 | 0.655 |
| Work methods | 76 | 0.74(.35) | 8 | 100 | 0.71(0.20) | 8 | 24 | -0.03 | 0 | 3435 | 0.252 |
| IT systems | 75 | 0.65(.38) | 22 | 103 | 0.61(0.25) | 22 | 28 | -0.04 | 0 | 3456 | 0.215 |
| Training | 75 | 0.66(.39) | 21 | 102 | 0.62(0.24) | 19 | 27 | -0.04 | -2 | 3456 | 0.258 |
| Innovation capture | 76 | 0.61(.43) | 24 | 99 | 0.56(0.26) | 25 | 23 | -0.05 | 1 | 3297 | 0.151 |
| Measurement ability | 78 | 0.74(.41) | 7 | 105 | 0.75(0.23) | 3 | 27 | 0.01 | -4 | 4064 | 0.927 |
| Estimating ability | 78 | 0.78(.38) | 4 | 104 | 0.74(0.19) | 4 | 26 | -0.04 | 0 | 3554 | 0.135 |
| Cost control ability (*) | 77 | 0.77(.34) | 5 | 104 | 0.71(0.20) | 7 | 27 | -0.06 | 2 | 3291 | 0.032 |
| Cost knowledge | 77 | 0.74(.38) | 9 | 103 | 0.73(0.22) | 5 | 26 | -0.01 | -4 | 3888 | 0.816 |
| Construction knowledge | 78 | 0.70(.42) | 16 | 106 | 0.66(0.25) | 18 | 28 | -0.04 | 2 | 3808 | 0.347 |
| Legal knowledge | 77 | 0.70(.34) | 15 | 104 | 0.69(0.23) | 12 | 27 | -0.01 | -3 | 3946 | 0.862 |
| <i>n</i> | = | <i>number of responses</i> | | | | | | | | | |
| <i>m_{IFP}(sd)</i> | = | <i>mean Internal Factor performance score (standard deviation)</i> | | | | | | | | | |
| <i>r</i> | = | <i>rank</i> | | | | | | | | | |
| <i>U</i> | = | <i>Mann-Whitney U</i> | | | | | | | | | |
| <i>p</i> | = | <i>2-tailed Asymptotic Significance (p-value)</i> | | | | | | | | | |
| (*) | = | <i>significant at an alpha level of 0.050</i> | | | | | | | | | |

5.4.4 Change in Correlations per Internal Factor

In the below table compares the change and correlation coefficients (in terms of total correlation scores and rank) of the internal factors between the Original and Follow-up observations. Every factor changed rank somewhat between the two stages. Notably, training and upskilling initiatives and

channels for capturing innovation and creativity both remained very high for both stages. Internal factors that gained relatively higher levels of correlation between the two stages included leadership and people management. Leadership rose from 24th to 7th place, and people management 23rd to 4th. On the other hand, legal knowledge fell from 1st to 20th place, and networks and cost control ability both fell 18 places.

Table 72: Change in Correlations per Internal Factor

| Internal Factor | Original Observation | | Follow-up Observation | | Change | |
|-------------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|
| | Correl. Coeffs. Total | Correl. Coeffs. Rank | Correl. Coeffs. Total | Correl. Coeffs. Rank | Correl. Coeffs. Total | Correl. Coeffs. Rank |
| Leadership | 0.236 | 24 | 1.760 | 7 | 1.524 | 17 |
| Market awareness | 1.816 | 9 | 1.780 | 6 | -0.036 | 3 |
| Strategic management | 1.697 | 10 | 2.389 | 3 | 0.692 | 7 |
| Firm flexibility | 1.208 | 13 | 0.823 | 15 | -0.385 | -2 |
| People management | 0.248 | 23 | 2.292 | 4 | 2.044 | 19 |
| Interpersonal skill | 1.124 | 15 | 0.635 | 19 | -0.489 | -4 |
| Communication skill | 0.842 | 19 | 0.610 | 21 | -0.232 | -2 |
| Rigour | 0.214 | 25 | 0.194 | 26 | -0.020 | -1 |
| Teamwork | 0.478 | 22 | 0.347 | 24 | -0.131 | -2 |
| Ethical conduct | 0.744 | 20 | 0.897 | 12 | 0.153 | 8 |
| Relationship management | 0.000 | 26 | 0.382 | 23 | 0.382 | 3 |
| Client quality | 1.445 | 11 | 0.673 | 17 | -0.772 | -6 |
| Networks | 2.472 | 4 | 0.459 | 22 | -2.013 | -18 |
| Brand | 1.297 | 12 | 1.402 | 10 | 0.105 | 2 |
| International reach | 1.123 | 16 | 1.005 | 11 | -0.118 | 5 |
| Knowledge management | 1.049 | 17 | 0.668 | 18 | -0.381 | -1 |
| Work methods | 1.150 | 14 | 1.855 | 5 | 0.705 | 9 |
| IT systems | 2.068 | 8 | 1.440 | 9 | -0.628 | -1 |
| Training | 3.110 | 2 | 3.490 | 1 | 0.380 | 1 |
| Innovation capture | 2.827 | 3 | 2.609 | 2 | -0.218 | 1 |
| Measurement ability | 0.509 | 21 | 0.883 | 14 | 0.374 | 7 |
| Estimating ability | 0.946 | 18 | 0.886 | 13 | -0.060 | 5 |
| Cost control ability | 2.144 | 7 | 0.315 | 25 | -1.829 | -18 |
| Cost knowledge | 2.161 | 6 | 1.566 | 8 | -0.745 | -3 |
| Construction knowledge | 2.311 | 5 | 0.735 | 16 | -1.426 | -10 |
| Legal knowledge | 3.197 | 1 | 0.616 | 20 | -2.581 | -19 |

5.5 Hypotheses Tests

5.5.1 Results of Test of Hypothesis 1

Hypothesis 1 was proposed to test whether perceptions of Internal Factor importance and External Factor impact change over time.

Where the perceived impact of the i^{th} (Internal or External) Factor in the original observation is expressed as F^{Obs1}_i and the perceived impact of that same Factor in the second-round observation is expressed as F^{Obs2}_i , then the null and alternative hypotheses were defined as:

H1₀: There is no difference in perceived impacts of F^{Obs1}_i and F^{Obs2}_i

H1₁: There is a difference in perceived impacts of F^{Obs1}_i and F^{Obs2}_i

The Mann-Whitney U test was selected to determine whether the difference in perceptions of Internal Factor importance and External Factor impact between the two independent groups (original observation and follow-up observation) is statistically significant. The predefined alpha was set for 0.05.

The results of the Mann-Whitney U test for the difference between the perceived ‘impact’ and ‘importance’ means of the two groups are presented in Table 67 and Table 69 of section 5.4. The results show a statistically significant U-value exists for 8 of 54 variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

5.5.2 Results of Test of Hypothesis 2

Hypothesis 2 was proposed to test whether perceptions of Internal factor importance and External Factor impact are culturally specific. The perceptions of NZIQS and non-NZIQS respondents will be compared in this test.

To test this hypothesis, the responses of NZIQS respondents will be compared with the responses of non-NZIQS members. Where NZIQS member respondents' mean score of the perceived impact or importance of the i^{th} Factor is expressed as F^{NZ}_i and the mean score of non-NZIQS respondents on the perceived impact or importance of that same Factor is expressed as F^{NonNZ}_i , then the null and alternative hypotheses were defined as:

H2₀: There is no difference in the perceived impact or importance of Fa^{NZ}_i and Fa^{NonNZ}_i

H2₁: There is a difference in the perceived impact or importance of Fa^{NZ}_i and Fa^{NonNZ}_i

The Mann-Whitney U test was selected to determine whether the difference in perceptions of Internal factor importance and External Factor impact between the two independent groups (NZIQS and non-NZIQS) is statistically significant. The predefined alpha level was set for 0.05.

The results of the Mann-Whitney U test for the difference between the perceived 'impact' and 'importance' means of the two groups are presented in Table 33 and Table 38 of section 5.2. The results show a statistically significant U-value exists for 7 of 54 variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

5.5.3 Results of Test of Hypothesis 3

Hypothesis 3 was proposed to test whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders. The perceptions of Consultant QS and 'other' respondents will be compared in this test.

‘Internal stakeholders’ are defined as respondents that identified as consultant QS’s. All other respondents are defined as ‘external stakeholders’. Where internal stakeholder respondents’ mean score of the perceived impact or importance of the i^{th} Factor is expressed as F^{IntSH}_i and the external stakeholder respondents’ mean score of the perceived impact or importance of that same Factor is expressed as F^{ExtSH}_i , then the null and alternative hypotheses were defined as:

H3₀: There is no difference in the perceived impact or importance of F^{IntSH}_i and F^{ExtSH}_i

H3₁: There is a difference in the perceived impact or importance of F^{IntSH}_i and F^{ExtSH}_i

The Mann-Whitney U test was selected to determine whether the difference in perceptions of Internal factor importance and External Factor impact between the two independent groups (Consultant QS’s and others) is statistically significant. The predefined alpha level was set for 0.05.

The results of the Mann-Whitney U test for the difference between the perceived ‘impact’ and ‘importance’ means of the two groups are presented in Table 35 and Table 40 of section 5.2. The results show a statistically significant U-value exists for 4 of 54 variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

5.5.4 Results of Test of Hypothesis 4

Hypothesis 4 was proposed to test whether perceptions of Internal factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with for carrying it out. The perceptions of ‘Highly Senior’ and ‘Emerging’ respondents will be compared in this test.

It was identified in the literature that strategic planning in QS firms tended to be the domain of senior management. Years of experience was used as a proxy for ‘seniority’. In order to have two similarly

sized groups of respondents, respondents with over 10 years' experience were considered senior, while respondents with 10 years or less experience were considered non-senior.

Where senior level respondents' mean score of on the perceived impact or importance of the i^{th} Factor is expressed as F^{sen}_i and the mean score of non-senior level respondents on the perceived impact or importance of that same Factor is expressed as F^{NonSen}_i , then the null and alternative hypotheses were defined as:

H4₀: There is no difference in the perceived impact or importance of F^{sen}_i and F^{NonSen}_i

H4₁: There is a difference in the perceived impact or importance of F^{sen}_i and F^{NonSen}_i

The Mann-Whitney U test was selected to determine whether the difference in perceptions of Internal factor importance and External Factor impact between the two independent groups (Highly Senior and Emerging) is statistically significant. The predefined alpha level was set for 0.05.

The results of the Mann-Whitney U test for the difference between the perceived 'impact' and 'importance' means of the two groups are presented in Table 34 and Table 39 of section 5.2. The results show a statistically significant U-value exists for 8 of 54 variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

5.5.5 Results of Test of Hypothesis 5

Hypothesis 5 was proposed to test whether a relationship exists between the perceived impact of External Factors and perceived importance of Internal Factors. The 'impact of External Factors' is the independent variable, and 'importance of Internal Factors' is the dependent variable.

Where the perceived impact of the i^{th} External Force (EF_i) is the independent variable, and the importance rating of the j^{th} Internal Force (IF_j) is the dependent variable, then the null and alternative hypotheses were defined as:

H5₀: There is no positive or negative relationship between changes in the relative impact of EF_i and the relative importance rating of IF_j

H5₁: There is a positive (or negative) relationship between changes in the relative impact of EF_i and the relative importance rating of IF_j

There are 28 Forces and 26 Attributes, so 728 Force-Attribute combinations will be tested. Spearman's Rank Correlation Coefficient was selected to assesses the strength of the relationship between two variables of rank ordered data. The predefined alpha level was set for 0.05.

The results of the Spearman's Rank Correlation Coefficient test for each combination of the two variables are presented in Table 102 of section Appendix I. The results show a statistically significant Spearman's rho value exists for 129 of 728 possible pairs of variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

5.5.6 Results of Test of Hypothesis 6

Hypothesis 6 was proposed to test whether the total correlation scores per Internal Factor remain constant over time. The two independent points in time of the original and follow-up observations are the independent variables, the dependent variable is the rank order of the Internal Factors' total correlation scores.

Where the rank ordered total correlation score of the i^{th} Internal Factor in the original observation is expressed as $IF^{CorrelIRO}_i$ and the rank ordered total correlation score of that same Internal Factor in the

second-round observation is expressed as $IF^{Correl2RO}_i$, then the null and alternative hypotheses were defined as:

H6₀: There is no difference between $IF^{Correl1RO}_i$ and $IF^{Correl2RO}_i$

H6₁: There is a difference between $IF^{Correl1RO}_i$ and $IF^{Correl2RO}_i$

The presence of perfectly matched pairs between both sets of data was selected to test the hypothesis.

The results of the correlation ranks are presented in Table 72 of section 5.4. The results show the ranking of all 26 Internal Factors changed between the two observations. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

5.6 Chapter Summary

This chapter has presented the results of the descriptive research phase which consisted of the gathering of quantitative data through questionnaire surveys. The results of the original observations were presented in section 5.2, and the results of the follow-up observation in section 5.3. The results of comparisons between the two observations were presented in section 5.4.

The third of the research aims – which was to address is to quantify the relative importance of the Internal Factors; the relative impact of the External Factors, and; the degree of matching between combinations of Internal and External Factors – was resolved in this chapter. Overall, eight objectives were satisfied:

- a. The perceived impact of the External Factors (established in the Exploratory Stage) were quantified.

- b. The importance placed on the Internal Factors (also established in the Exploratory Stage) in view of the state in the External Environment at the time were quantified.
- c. It was established that perceptions of Internal Factor importance and External Factor impact do change over time; the alternative hypothesis for Hypothesis 1 was therefore supported.
- d. It was established that perceptions of Internal factor importance and External Factor impact are culturally specific; the alternative hypothesis for Hypothesis 2 was consequently supported.
- e. It was established that perceptions of Internal factor importance and External Factor impact do vary between internal and external stakeholders; the alternative hypothesis for Hypothesis 3 was supported as a result.
- f. It was established that perceptions of Internal Factor importance and External Factor impact vary between those responsible for creating strategy and those responsible for carrying it out; the alternative hypothesis for Hypothesis 4 was therefore supported.
- g. The extents to which Internal Factors can be matched with External Factors (External Factor / Internal Factor relationship) resulting in strengths leveraged, opportunities missed, weaknesses undermined, and threats mitigated were quantified, and it was found that statistically significant relationships do exist; therefore, the alternative hypothesis for Hypothesis 5 was consequently supported.
- h. It was established that the strength of External Factor / Internal Factor relationships do in fact change over time; accordingly, the alternative hypothesis for Hypothesis 6 was supported.

6.0 DEVELOPED RESEARCH MODELS

6.1 Chapter Introduction

This study aims to develop a model that enables QS firms to assess their strategic health and identify areas for improvement. The definition of Strategic Health adopted for this study is an organisation's level of ability to successfully execute its strategic objectives.

This chapter presents the proposed model that is populated with data gathered in the quantitative descriptive survey stage and will be tested through the evaluative case studies.

6.2 Presentation of Model 1: 'Perceived Importance'-Based Model

6.2.1 Theoretical basis

Model 1 follows the resource-based view (RBV) of strategic planning; focussing on the importance of the firm's internal resources. This model is provided as a means of comparison for Model 2 which is grounded in the design school of strategy formation.

6.2.2 Model computation

Computation of the model comprises 4 main steps – set out in the following sections.

6.2.2.1 Step 1: Determine value of Internal Factors

The value of Internal Factors in this model are based on perception data regarding the importance of each Factor to the success of a typical QS firm. The sentiment data obtained in the Descriptive Survey

phase regarding the 'importance' of the Internal Factors provides the value rating. These ratings are presented in Table 37 and Table 61 (for the Original and Follow-up Observations respectively) on a scale ranging from 0.0 (no importance) to 1.0 (maximum importance).

6.2.2.2 Step 2: Determine performance of Internal Factors

Performance rating were also taken from the Descriptive Survey Data. These ratings are presented in Table 41 and Table 62 (for the Original and Follow-up Observations respectively) on a scale ranging from 0.0 (no importance) to 1.0 (maximum importance).

6.2.2.3 Step 3: Determine 'health' of Internal Factors

The actual health score of the Internal Factors is simply the product of multiplying the performance score by the value rating for each Factor.

6.2.2.4 Step 4: Rescaling for meaningful interpretation and calculation of total 'health' score

The health score for each Internal Factor can be re-scaled and presented as a proportion of the sum of the health scores for all Internal Factors to provide a sense of each factor's contribution to the organisations' overall health. Similarly, the firm's overall health score can be expressed as a percentage based on the total actual health score divided by the total product score.

6.2.3 Presentation of Model 1 Performance Results

6.2.3.1 Typical QS Firm Performance Based on Original Observation Data

The table below presents the results of the Original Observation data applied to Model 1. Model 1 regards ethical conduct, rigour and relationship management as the most valuable Internal Factors. The most valuable Internal Factor (estimating ability = 0.93) is 'worth' 1.43 times the amount of the least valuable (international reach = 0.65).

In this model, typical firms achieve a 71% health rating and the largest contributions to health are from estimating ability (4.34%), rigour (4.29%) and ethical conduct (4.74%). The smallest contributions to firm health come from international reach (3.03%), and IT system (3.40%).

The most urgent improvement areas (based on the gap between value and performance) are people management, training, and innovation capture.

Table 73: Typical QS Firm Model 1 Performance Based on Original Observation Data

| Internal Factor | Performance | | | Value | | | Health | | Improvement Requirement | |
|-------------------------|-------------|-------|------|-------|-------|------|--------|------|-------------------------|------|
| | Score | | Rank | Score | % | Rank | Score | Rank | % | Rank |
| Leadership | 0.68 | 3.69% | 17 | 0.78 | 3.64% | 21 | 0.530 | 20 | -0.05% | 16 |
| Market awareness | 0.71 | 3.85% | 14 | 0.82 | 3.82% | 15 | 0.582 | 15 | -0.03% | 14 |
| Strategic management | 0.68 | 3.69% | 17 | 0.77 | 3.59% | 22 | 0.524 | 21 | -0.10% | 19 |
| Firm flexibility | 0.68 | 3.69% | 17 | 0.83 | 3.87% | 14 | 0.564 | 17 | 0.18% | 4 |
| People management | 0.61 | 3.31% | 24 | 0.79 | 3.68% | 20 | 0.482 | 22 | 0.38% | 1 |
| Interpersonal skill | 0.72 | 3.90% | 12 | 0.85 | 3.96% | 8 | 0.612 | 11 | 0.06% | 9 |
| Communication Skill | 0.73 | 3.96% | 10 | 0.88 | 4.10% | 5 | 0.642 | 6 | 0.15% | 5 |
| Rigour | 0.81 | 4.39% | 2 | 0.92 | 4.29% | 2 | 0.745 | 2 | -0.10% | 20 |
| Teamwork | 0.75 | 4.07% | 6 | 0.84 | 3.92% | 10 | 0.630 | 8 | -0.15% | 22 |
| Ethical conduct | 0.82 | 4.44% | 1 | 0.92 | 4.29% | 2 | 0.754 | 1 | -0.16% | 23 |
| Relationship management | 0.79 | 4.28% | 3 | 0.87 | 4.06% | 6 | 0.687 | 4 | -0.23% | 24 |
| Client quality | 0.73 | 3.96% | 10 | 0.80 | 3.73% | 19 | 0.584 | 14 | -0.23% | 25 |
| Networks | 0.72 | 3.90% | 12 | 0.82 | 3.82% | 15 | 0.590 | 12 | -0.08% | 17 |
| Brand | 0.64 | 3.47% | 23 | 0.74 | 3.45% | 24 | 0.474 | 24 | -0.02% | 12 |
| International reach | 0.61 | 3.31% | 24 | 0.65 | 3.03% | 26 | 0.397 | 26 | -0.28% | 26 |
| Knowledge management | 0.68 | 3.69% | 17 | 0.81 | 3.78% | 18 | 0.551 | 19 | 0.09% | 8 |
| Work methods | 0.74 | 4.01% | 7 | 0.84 | 3.92% | 10 | 0.622 | 10 | -0.09% | 18 |
| IT systems | 0.65 | 3.52% | 22 | 0.73 | 3.40% | 25 | 0.475 | 23 | -0.12% | 21 |
| Training | 0.66 | 3.58% | 21 | 0.84 | 3.92% | 10 | 0.554 | 18 | 0.34% | 2 |

| | | | | | | | | | | |
|------------------------|--------------|-------------|-----------|--------------|-------------|-----------|---------------|-----------|-------------|-----------|
| Innovation capture | 0.61 | 3.31% | 24 | 0.76 | 3.54% | 23 | 0.464 | 25 | 0.24% | 3 |
| Measurement ability | 0.74 | 4.01% | 7 | 0.86 | 4.01% | 7 | 0.636 | 7 | 0.00% | 11 |
| Estimating ability | 0.78 | 4.23% | 4 | 0.93 | 4.34% | 1 | 0.725 | 3 | 0.11% | 7 |
| Cost control ability | 0.77 | 4.17% | 5 | 0.89 | 4.15% | 4 | 0.685 | 5 | -0.02% | 13 |
| Cost knowledge | 0.74 | 4.01% | 7 | 0.85 | 3.96% | 8 | 0.629 | 9 | -0.05% | 15 |
| Construction knowledge | 0.70 | 3.79% | 15 | 0.84 | 3.92% | 10 | 0.588 | 13 | 0.12% | 6 |
| Legal knowledge | 0.70 | 3.79% | 15 | 0.82 | 3.82% | 15 | 0.574 | 16 | 0.03% | 10 |
| Total | 18.45 | 100% | 26 | 21.45 | 100% | 26 | 15.301 | 26 | 0.0% | 26 |
| Rescaled Total | 71% | | - | 100% | - | - | 71% | - | - | - |
| R = rank | | | | | | | | | | |

6.2.3.2 Typical QS Firm Performance Based on Follow-up Observation Data

The table below applies Model 1 to the Follow-up Observation data. Model 1 regards ethical conduct, rigour and estimating ability as the most valuable Internal Factors. The most valuable Internal Factor (ethical conduct = 0.91) is ‘worth’ 1.57 times the amount of the least valuable (international reach = 0.58).

In the Follow-up Observation, typical firms achieve a 67% health rating; the largest contributions to health are from rigour (4.83%), ethical conduct (4.82%), and estimating ability (4.71%). The smallest contributions to firm health come from international reach (2.34%), and brand (2.6%).

The most urgent improvement areas (based on the gap between value and performance) are training, innovation capture, and leadership.

Table 74: Typical QS Firm Model 1 Performance Based on Follow-up Observation Data

| Internal Factor | Performance | | | Value | | | Health | | Improvement Requirement | |
|----------------------|-------------|-------|------|-------|-------|------|--------|------|-------------------------|------|
| | Score | | Rank | Score | % | Rank | Score | Rank | % | Rank |
| Leadership | 0.70 | 4.02% | 9 | 0.89 | 4.24% | 4 | 0.623 | 5 | 0.22% | 3 |
| Market awareness | 0.67 | 3.85% | 14 | 0.82 | 3.91% | 12 | 0.549 | 12 | 0.06% | 8 |
| Strategic management | 0.62 | 3.56% | 19 | 0.77 | 3.67% | 20 | 0.477 | 20 | 0.11% | 6 |
| Firm flexibility | 0.60 | 3.44% | 23 | 0.76 | 3.62% | 22 | 0.456 | 22 | 0.18% | 4 |
| People management | 0.62 | 3.56% | 19 | 0.77 | 3.67% | 20 | 0.477 | 20 | 0.11% | 6 |
| Interpersonal skill | 0.67 | 3.85% | 14 | 0.81 | 3.86% | 16 | 0.543 | 16 | 0.01% | 14 |
| Communication Skill | 0.70 | 4.02% | 9 | 0.85 | 4.05% | 6 | 0.595 | 10 | 0.03% | 12 |

| | | | | | | | | | | |
|-------------------------|--------------|-------------|-----------|--------------|-------------|-----------|---------------|-----------|-------------|-----------|
| Rigour | 0.76 | 4.36% | 1 | 0.90 | 4.29% | 2 | 0.684 | 1 | -0.07% | 21 |
| Teamwork | 0.67 | 3.85% | 14 | 0.82 | 3.91% | 12 | 0.549 | 12 | 0.06% | 8 |
| Ethical conduct | 0.75 | 4.31% | 2 | 0.91 | 4.34% | 1 | 0.683 | 2 | 0.03% | 13 |
| Relationship management | 0.72 | 4.13% | 6 | 0.86 | 4.10% | 5 | 0.619 | 6 | -0.03% | 16 |
| Client quality | 0.69 | 3.96% | 11 | 0.79 | 3.77% | 17 | 0.545 | 14 | -0.20% | 23 |
| Networks | 0.69 | 3.96% | 11 | 0.79 | 3.77% | 17 | 0.545 | 14 | -0.20% | 23 |
| Brand | 0.55 | 3.16% | 26 | 0.67 | 3.19% | 25 | 0.369 | 25 | 0.04% | 11 |
| International reach | 0.57 | 3.27% | 24 | 0.58 | 2.76% | 26 | 0.331 | 26 | -0.51% | 26 |
| Knowledge management | 0.66 | 3.79% | 17 | 0.78 | 3.72% | 19 | 0.515 | 18 | -0.07% | 18 |
| Work methods | 0.71 | 4.08% | 7 | 0.84 | 4.00% | 8 | 0.596 | 8 | -0.07% | 19 |
| IT systems | 0.61 | 3.50% | 22 | 0.73 | 3.48% | 24 | 0.445 | 23 | -0.02% | 15 |
| Training | 0.62 | 3.56% | 19 | 0.83 | 3.96% | 11 | 0.515 | 19 | 0.40% | 1 |
| Innovation capture | 0.56 | 3.21% | 25 | 0.74 | 3.53% | 23 | 0.414 | 24 | 0.31% | 2 |
| Measurement ability | 0.75 | 4.31% | 2 | 0.85 | 4.05% | 6 | 0.638 | 4 | -0.25% | 25 |
| Estimating ability | 0.74 | 4.25% | 4 | 0.90 | 4.29% | 2 | 0.666 | 3 | 0.04% | 10 |
| Cost control ability | 0.71 | 4.08% | 7 | 0.84 | 4.00% | 8 | 0.596 | 8 | -0.07% | 19 |
| Cost knowledge | 0.73 | 4.19% | 5 | 0.84 | 4.00% | 8 | 0.613 | 7 | -0.19% | 22 |
| Construction knowledge | 0.66 | 3.79% | 17 | 0.82 | 3.91% | 12 | 0.541 | 17 | 0.12% | 5 |
| Legal knowledge | 0.69 | 3.96% | 11 | 0.82 | 3.91% | 12 | 0.566 | 11 | -0.05% | 17 |
| Total | 17.42 | 100% | 26 | 20.98 | 100% | 26 | 14.151 | 26 | 0.0% | 26 |
| Rescaled Total | 67% | | - | 100% | - | - | 67% | - | - | - |
| R = rank | | | | | | | | | | |

6.3 Presentation of Model 2: ‘Internal-External Factor Correlation’-Based Model (Strategic Health Model)

6.3.1 Theoretical basis

Model 2 is firmly grounded in the Design School approach to strategy formation in that it captures the confluence of Internal and External Factors. Specifically, it provides a quantitative means (correlation analysis) of defining the strength of the relationship between Internal and External Factors and uses this as a basis for valuing the importance of Internal Factors. This is a concept known in the literature as matching, although, its applications were hitherto limited to qualitative methods.

6.3.2 Model computation

6.3.2.1 Step 1: Determine Value of Internal Factors

The key point of difference between the two models is the method for determining the value of Internal Factors. In Model 2, the value of Internal Factor is equal to the strength of their relationship with external factors (total leverage score). This process is set out in the sub-steps below.

6.3.2.1.1 Step 1(a): Determine Impact Rating of External Factors

The first step is determining the magnitude of the impact of each External Factor. In the developed mode, these rating were taken from the Depolarised Impact Ratings, generated from the descriptive survey. These ratings are presented in Table 36 and Table 60 (for the Original and Follow-up Observations respectively) on a scale ranging from 0.0 (no impact) to 1.0 (maximum impact).

6.3.2.1.2 Step 1(b): Determine Importance Rating of Internal Factors

Performance rating were also taken from the Descriptive Survey Data. These ratings are presented in Table 41 and Table 62 (for the Original and Follow-up Observations respectively) on a scale ranging from 0.0 (no importance) to 1.0 (maximum importance).

6.3.2.1.3 Step 1(c): Determine the Correlation Between External and Internal Factors (matching)

The Force-Attribute relationships analysed in the Descriptive Research Results chapter were used for the model development. External-Internal Factor relationships are defined as the correlation between the relative levels of each combination of External Factor impact and Internal Factor importance. The

supposition is that as the likely impact of a given EF changes, there will be a corresponding change in the importance level ascribed to any IF that firms could use to mitigate or leverage the impact of that EF. Spearman's Rho was used to analyse these correlations. Correlations range from -1.0 (perfect negative correlation) to 1.0 (perfect positive correlation). As there are 26 Attributes and 28 Forces there are a total of 728 possible combinations, 129 of these were found to exhibit a statistically significant correlation. The total correlation scores for each IF, are presented in Table 47 and Table 66 for the Original and Follow-up Observations respectively.

6.3.2.2 Step X: Determine strategic value rating of Internal Factors

For each Internal Factor, its strategic value rating is calculated by the sum of every Force-Attribute relationship correlation applicable to that Internal Factor, multiplied by the corresponding External Factor impact rating.

6.3.2.3 Step 2: Determine performance of Internal Factors

Determining of Internal Factor importance ratings is as described in step 1(b) above.

6.3.2.4 Step 3: Determine 'health' of Internal Factors

As with Model 1, the actual health score of the Internal Factors is simply the product of multiplying the performance score by the value rating for each Factor.

6.3.2.5 *Step 4: Rescaling for meaningful interpretation and calculation of total ‘health’ score*

As with Model 1, the Strategic Health score for each Internal Factor can be re-scaled and presented as a proportion of the sum of the health scores for all Internal Factors to provide a sense of each factor’s contribution to the organisations’ overall health. Similarly, the firm’s overall health score can be expressed as a percentage based on the total actual health score divided by the total product score.

6.3.3 Presentation of Model 2 Performance Results

6.3.3.1 *Typical QS Firm Performance Based on Original Observation Data*

The table below presents the results of the Original Observation data applied to Model 2. The Strategic Health Model computes training, legal knowledge, and innovation capture as the three most valuable Internal Factors. The most valuable Internal Factor (training = 1.61) is ‘worth’ 20.1 times the amount of the least valuable (rigour = 0.08).

In this model, typical firms achieve a 70% health rating and the largest contributions to health are from training (8.72%), legal knowledge (8.45%), and innovation capture (7.96%). The smallest contributions to firm health come from relationship management (0.00%), and rigour (0.46%).

The most urgent improvement areas (based on the gap between value and performance) are training, legal knowledge, and innovation capture.

Table 75: Typical QS Firm Model 2 Performance Based on Original Observation Data

| Internal Factor | Performance | | | Strategic Value | | | Strategic Health | | Improvement Requirement | |
|----------------------|-------------|-------|----|-----------------|-------|----|------------------|----|-------------------------|----|
| | Score | | R | Score | % | R | Score | R | % | R |
| Leadership | 0.68 | 3.69% | 17 | 0.10 | 0.57% | 24 | 0.071 | 24 | -3.12% | 24 |
| Market awareness | 0.71 | 3.85% | 14 | 0.93 | 5.01% | 9 | 0.658 | 9 | 1.16% | 8 |
| Strategic management | 0.68 | 3.69% | 17 | 0.80 | 4.33% | 10 | 0.544 | 11 | 0.64% | 10 |
| Firm flexibility | 0.68 | 3.69% | 17 | 0.60 | 3.23% | 16 | 0.406 | 16 | -0.45% | 15 |

| | | | | | | | | | | |
|-------------------------|--------------|-------------|-----------|--------------|-------------|-----------|--------------|-----------|-------------|-----------|
| People management | 0.61 | 3.31% | 24 | 0.15 | 0.79% | 23 | 0.089 | 23 | -2.52% | 21 |
| Interpersonal skill | 0.72 | 3.90% | 12 | 0.60 | 3.26% | 15 | 0.434 | 14 | -0.64% | 17 |
| Communication Skill | 0.73 | 3.96% | 10 | 0.44 | 2.37% | 18 | 0.320 | 19 | -1.58% | 18 |
| Rigour | 0.81 | 4.39% | 2 | 0.08 | 0.46% | 25 | 0.069 | 25 | -3.93% | 25 |
| Teamwork | 0.75 | 4.07% | 6 | 0.25 | 1.34% | 21 | 0.186 | 21 | -2.72% | 22 |
| Ethical conduct | 0.82 | 4.44% | 1 | 0.38 | 2.06% | 20 | 0.313 | 20 | -2.38% | 20 |
| Relationship management | 0.79 | 4.28% | 3 | - | 0.00% | 26 | - | 26 | -4.28% | 26 |
| Client quality | 0.73 | 3.96% | 10 | 0.78 | 4.23% | 11 | 0.571 | 10 | 0.28% | 12 |
| Networks | 0.72 | 3.90% | 12 | 1.35 | 7.28% | 4 | 0.969 | 3 | 3.38% | 4 |
| Brand | 0.64 | 3.47% | 23 | 0.71 | 3.82% | 12 | 0.451 | 13 | 0.35% | 11 |
| International reach | 0.61 | 3.31% | 24 | 0.55 | 2.97% | 17 | 0.335 | 17 | -0.33% | 13 |
| Knowledge management | 0.68 | 3.69% | 17 | 0.60 | 3.27% | 14 | 0.411 | 15 | -0.42% | 14 |
| Work methods | 0.74 | 4.01% | 7 | 0.63 | 3.38% | 13 | 0.463 | 12 | -0.63% | 16 |
| IT systems | 0.65 | 3.52% | 22 | 1.05 | 5.69% | 7 | 0.683 | 8 | 2.16% | 6 |
| Training | 0.66 | 3.58% | 21 | 1.61 | 8.72% | 1 | 1.064 | 2 | 5.14% | 1 |
| Innovation capture | 0.61 | 3.31% | 24 | 1.47 | 7.96% | 3 | 0.897 | 4 | 4.65% | 3 |
| Measurement ability | 0.74 | 4.01% | 7 | 0.22 | 1.20% | 22 | 0.165 | 22 | -2.81% | 23 |
| Estimating ability | 0.78 | 4.23% | 4 | 0.43 | 2.31% | 19 | 0.333 | 18 | -1.92% | 19 |
| Cost control ability | 0.77 | 4.17% | 5 | 0.99 | 5.33% | 8 | 0.759 | 7 | 1.16% | 9 |
| Cost knowledge | 0.74 | 4.01% | 7 | 1.07 | 5.76% | 6 | 0.788 | 6 | 1.75% | 7 |
| Construction knowledge | 0.70 | 3.79% | 15 | 1.15 | 6.21% | 5 | 0.803 | 5 | 2.41% | 5 |
| Legal knowledge | 0.70 | 3.79% | 15 | 1.56 | 8.45% | 2 | 1.093 | 1 | 4.65% | 2 |
| Total | 18.45 | 100% | 26 | 18.49 | 100% | 26 | 12.87 | 26 | 0.0% | 26 |
| Rescaled Total | 71% | | - | 100% | - | - | 70% | - | - | - |

R = rank

6.3.3.2 Typical QS Firm Performance Based on Follow-up Observation Data

The table below applies Model 2 to the Follow-up Observation data. The Strategic Health model computes training, people management, and innovation capture as the three most valuable Internal Factors. The most valuable Internal Factor (training = 1.72) is ‘worth’ 19.1 times the amount of the least valuable (rigour = 0.09).

In the Follow-up Observation, typical firms achieve a 65% health rating; the largest contributions to health are from training (11.45%), people management (8.67%), and innovation capture (8.38%). The smallest contributions to firm health come from rigour (0.60%), and teamwork (0.86%).

The most urgent improvement areas (based on the gap between value and performance) are training, innovation capture, and people management.

Table 76: Typical QS Firm Model 2 Performance Based on Follow-up Observation Data

| Internal Factor | Performance | | | Strategic Value | | | Strategic Health | | Improvement Requirement | |
|-------------------------|--------------|-------------|-----------|-----------------|-------------|-----------|------------------|-----------|-------------------------|-----------|
| | Score | % | R | Score | % | R | Score | R | % | R |
| Leadership | 0.70 | 4.02% | 9 | 0.85 | 5.66% | 6 | 0.595 | 6 | 1.64% | 7 |
| Market awareness | 0.67 | 3.85% | 14 | 0.83 | 5.53% | 7 | 0.558 | 7 | 1.69% | 6 |
| Strategic management | 0.62 | 3.56% | 19 | 1.19 | 7.90% | 4 | 0.736 | 3 | 4.34% | 4 |
| Firm flexibility | 0.60 | 3.44% | 23 | 0.40 | 2.69% | 14 | 0.243 | 16 | -0.76% | 13 |
| People management | 0.62 | 3.56% | 19 | 1.30 | 8.67% | 2 | 0.809 | 2 | 5.11% | 3 |
| Interpersonal skill | 0.67 | 3.85% | 14 | 0.25 | 1.64% | 21 | 0.165 | 21 | -2.21% | 21 |
| Communication Skill | 0.70 | 4.02% | 9 | 0.28 | 1.88% | 19 | 0.198 | 19 | -2.14% | 20 |
| Rigour | 0.76 | 4.36% | 1 | 0.09 | 0.60% | 26 | 0.069 | 26 | -3.76% | 26 |
| Teamwork | 0.67 | 3.85% | 14 | 0.13 | 0.86% | 25 | 0.086 | 25 | -2.99% | 24 |
| Ethical conduct | 0.75 | 4.31% | 2 | 0.48 | 3.18% | 12 | 0.359 | 11 | -1.13% | 14 |
| Relationship management | 0.72 | 4.13% | 6 | 0.19 | 1.28% | 23 | 0.139 | 23 | -2.85% | 23 |
| Client quality | 0.69 | 3.96% | 11 | 0.31 | 2.08% | 17 | 0.216 | 17 | -1.88% | 18 |
| Networks | 0.69 | 3.96% | 11 | 0.21 | 1.37% | 22 | 0.142 | 22 | -2.59% | 22 |
| Brand | 0.55 | 3.16% | 26 | 0.67 | 4.43% | 10 | 0.367 | 10 | 1.28% | 9 |
| International reach | 0.57 | 3.27% | 24 | 0.49 | 3.28% | 11 | 0.281 | 14 | 0.01% | 11 |
| Knowledge management | 0.66 | 3.79% | 17 | 0.47 | 3.15% | 13 | 0.313 | 12 | -0.64% | 12 |
| Work methods | 0.71 | 4.08% | 7 | 0.99 | 6.57% | 5 | 0.701 | 5 | 2.49% | 5 |
| IT systems | 0.61 | 3.50% | 22 | 0.73 | 4.83% | 8 | 0.443 | 9 | 1.32% | 8 |
| Training | 0.62 | 3.56% | 19 | 1.72 | 11.45% | 1 | 1.068 | 1 | 7.89% | 1 |
| Innovation capture | 0.56 | 3.21% | 25 | 1.26 | 8.38% | 3 | 0.706 | 4 | 5.16% | 2 |
| Measurement ability | 0.75 | 4.31% | 2 | 0.37 | 2.46% | 16 | 0.278 | 15 | -1.84% | 17 |
| Estimating ability | 0.74 | 4.25% | 4 | 0.39 | 2.59% | 15 | 0.288 | 13 | -1.66% | 15 |
| Cost control ability | 0.71 | 4.08% | 7 | 0.15 | 1.00% | 24 | 0.107 | 24 | -3.08% | 25 |
| Cost knowledge | 0.73 | 4.19% | 5 | 0.69 | 4.61% | 9 | 0.506 | 8 | 0.42% | 10 |
| Construction knowledge | 0.66 | 3.79% | 17 | 0.31 | 2.07% | 18 | 0.205 | 18 | -1.72% | 16 |
| Legal knowledge | 0.69 | 3.96% | 11 | 0.28 | 1.85% | 20 | 0.192 | 20 | -2.11% | 19 |
| Total | 17.42 | 100% | 26 | 15.04 | 100% | 26 | 9.770 | 26 | 0.0% | 26 |
| Rescaled Total | 67% | | - | 100% | - | - | 65% | - | - | - |

R = rank

6.4 Model Comparisons

The two models presented are based on the same basic data. Model 1 takes a simple resource-based view of Internal Factor weighting, namely the raw ‘importance’ scores ascribed to Internal Factors by the descriptive questionnaire respondents. Whilst entirely valid, this approach provides a somewhat ‘shallow’ model that struggles to highlight the key attributes that firms should focus on (the most powerful attribute is only 43-57% more powerful than the least important).

The Strategic Health model (Model 2), however, addresses this by taking a deeper and more sophisticated view of Internal Factor importance. In the Strategic Health model, the basic importance rating of Internal Factors is discarded in favour of considering each Internal Factor’s ability to match with External Factors to leverage strengths, mitigate threats, and avoid missed opportunities and undermined weaknesses as described in the developed conceptual framework for this study (section 6.3.1).

6.4.1 Identification of Priority Areas

A key difference between the two models is how Internal Factors are valued. The Model 2 methodology provides a far greater spread of values assigned to each Factor – this would make the prioritising of areas of investment clearer. In the Follow-up Observation, the most valuable Internal Factor was ‘worth’ 18.37 times the amount of the least valuable Factor, whereas in Model 1, this multiplier was only 1.57. A similar pattern is evident in the metric measuring the number of Factors holding at least 50% of the value (in terms of impact on firm health). In Model 1, the top 13 Factors need to be counted (total value 53.13%), whereas in Model 2 it is only 7 (total value 54.15%) – a substantial reduction in the number of Factors a firm would need to focus its performance improvement efforts on in order to see outcome improvements.

Not only is that rating methodology different, but also the resultant importance ranking of Internal Factors under both models as evident in the below table. All but one Factor (client quality) are ranked differently under each model. The three top ranked Factors under Model 2 (training, innovation capture and people management) are ranked 11th, 23rd and 20th under Model 1.

Table 77: Comparison of Internal Factor Importance Ranking Between Model 1 and Model 2

| Internal Factor | Model 1 Value | | | Model 2 Strategic Value | | | Rank Variance |
|-------------------------|---------------|-------|------|-------------------------|--------|------|---------------|
| | Score | % | Rank | Score | % | Rank | |
| Leadership | 0.89 | 4.24% | 4 | 0.85 | 5.66% | 6 | 2 |
| Market awareness | 0.82 | 3.91% | 12 | 0.83 | 5.53% | 7 | -5 |
| Strategic management | 0.77 | 3.67% | 20 | 1.19 | 7.90% | 4 | -16 |
| Firm flexibility | 0.76 | 3.62% | 22 | 0.40 | 2.69% | 14 | -8 |
| People management | 0.77 | 3.67% | 20 | 1.30 | 8.67% | 2 | -18 |
| Interpersonal skill | 0.81 | 3.86% | 16 | 0.25 | 1.64% | 21 | 5 |
| Communication Skill | 0.85 | 4.05% | 6 | 0.28 | 1.88% | 19 | 13 |
| Rigour | 0.90 | 4.29% | 2 | 0.09 | 0.60% | 26 | 24 |
| Teamwork | 0.82 | 3.91% | 12 | 0.13 | 0.86% | 25 | 13 |
| Ethical conduct | 0.91 | 4.34% | 1 | 0.48 | 3.18% | 12 | 11 |
| Relationship management | 0.86 | 4.10% | 5 | 0.19 | 1.28% | 23 | 18 |
| Client quality | 0.79 | 3.77% | 17 | 0.31 | 2.08% | 17 | 0 |
| Networks | 0.79 | 3.77% | 17 | 0.21 | 1.37% | 22 | 5 |
| Brand | 0.67 | 3.19% | 25 | 0.67 | 4.43% | 10 | -15 |
| International reach | 0.58 | 2.76% | 26 | 0.49 | 3.28% | 11 | -15 |
| Knowledge management | 0.78 | 3.72% | 19 | 0.47 | 3.15% | 13 | -6 |
| Work methods | 0.84 | 4.00% | 8 | 0.99 | 6.57% | 5 | -3 |
| IT systems | 0.73 | 3.48% | 24 | 0.73 | 4.83% | 8 | -16 |
| Training | 0.83 | 3.96% | 11 | 1.72 | 11.45% | 1 | -10 |
| Innovation capture | 0.74 | 3.53% | 23 | 1.26 | 8.38% | 3 | -20 |
| Measurement ability | 0.85 | 4.05% | 6 | 0.37 | 2.46% | 16 | 10 |
| Estimating ability | 0.90 | 4.29% | 2 | 0.39 | 2.59% | 15 | 13 |
| Cost control ability | 0.84 | 4.00% | 8 | 0.15 | 1.00% | 24 | 16 |
| Cost knowledge | 0.84 | 4.00% | 8 | 0.69 | 4.61% | 9 | 1 |
| Construction knowledge | 0.82 | 3.91% | 12 | 0.31 | 2.07% | 18 | 6 |
| Legal knowledge | 0.82 | 3.91% | 12 | 0.28 | 1.85% | 20 | 8 |

6.4.2 Identification of Improvement Areas

Both models signal improvement areas by calculating the gap between the ‘value’ and ‘health’ score of each Internal Factor – and providing a ranked priority order. However due to the underlying method of calculating Internal Factor value – the two models point to different Factors for prioritising. Furthermore, the impact of making improvements to the identified Factors is not the same for both models. For instance, sensitivity analysis undertaken on the Follow-up observation data for both models yielded the following increasing:

- Assuming a for a 0.20 basis point performance improvement to the top three priority improvement factors, yields:
 - A health score improvement for Model 1 of 1.9% (from 67.4% to 69.3%), and
 - A health score improvement for Model 2 of 4.8% (from 65.1% to 69.9%) – approximately 2.5 times the improvement experienced in Model 1 for the same increase in performance.

6.5 Hypotheses Tests

6.5.1 Results of Test of Hypothesis 7

Hypothesis 7 was proposed to test whether the ranking in Internal Factors in the ‘perceived importance-based’ model matches the ranking in the ‘External Force-matched’ model.

Where the rank ordered importance score of the i^{th} Internal Factor in the ‘perceived importance-based’ model (M1) is expressed as $IF^{ImportM1RO}_i$ and the rank ordered importance score of the i^{th} Internal Factor in the in the ‘External Force-matched’ model (M2) is expressed as $IF^{ImportM2RO}_i$, then the null and alternative hypotheses were defined as follows:

H7₀: There is no difference between $IF^{ImportM1RO}_i$ and $IF^{ImportM2RO}_i$

H7₁: There is a difference between $IF^{ImportM1RO}_i$ and $IF^{ImportM2RO}_i$

The presence of perfectly matched pairs between both sets of data was selected to test the hypothesis.

The results of the importance ranks according to Model 1 and 2 are presented in Table 77 of section 6.4. The results show a variance in the ranking of all but one of the 26 Internal Factors between the two models. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

6.5.2 Results of Test of Hypothesis 8

Hypothesis 8 was proposed to test whether QS firms' relative levels of performance of Internal Factors matches the order of importance (value) of those Factors based on the 'perceived importance-based' model (Model 1).

Where the rank ordered value score of the i^{th} Internal Factor in the 'perceived importance-based' model (M1) is expressed as $IF^{ImportM1RO}_i$ and the rank ordered performance score of that Internal Factor in the original observation is expressed as $IF^{PerfIRO}_i$, then the null and alternative hypotheses are written as follows:

H8₀: There is no difference between $IF^{ImportM1RO}_i$ and $IF^{PerfIRO}_i$

H8₁: There is a difference between $IF^{ImportM1RO}_i$ and $IF^{PerfIRO}_i$

Perfectly matched pairs between both sets of ranked data was selected to be the test for the hypothesis.

The rank order results of Internal Factors' value and performance based on the Follow-up Observation data under Model 1 were presented in Table 74.

The results show 26 of 26 pairs are discordant (ranks do not match). Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

6.5.3 Results of Test of Hypothesis 9

Hypothesis 9 was proposed to test whether QS firms' relative levels of performance of Internal Factors matches the order of importance (value) of those Factors based on the 'External Force-matched' model (Model 2).

Where the rank ordered value score of the i^{th} Internal Factor in the 'External Force-matched' model (M2) is expressed as $IF^{ImportM2RO}_i$ and the rank ordered performance score of that Internal Factor in the original observation is expressed as $IF^{PerfIRO}_i$, then the null and alternative hypotheses are written as follows:

H9₀: There is no difference between $IF^{ImportM2RO}_i$ and $IF^{PerfIRO}_i$

H9₁: There is a difference between $IF^{ImportM2RO}_i$ and $IF^{PerfIRO}_i$

Perfectly matched pairs between both sets of ranked data was selected to be the test for the hypothesis.

The rank order results of Internal Factors' value and performance based on the Follow-up Observation data under Model 2 were presented in Table 76.

The results show 26 of 26 pairs are discordant (ranks do not match). Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

6.6 Chapter Summary

This chapter resolved the study aim to develop a model that enables QS firms to assess their Strategic Health (ability to successfully execute its strategic objectives) and identify areas for improvement.

Two models were presented; Model 1 subscribes to the resource-based view of strategic planning, and Model 2 is centred in the Design School approach. Both models were populated with data gathered in the quantitative descriptive survey stage.

A key difference between the two models is how Internal Factors are valued. The Model 2 methodology provides a far greater spread of values assigned to each Factor – which is posited would make the prioritising of areas of investment clearer: the most valuable Internal Factor in Model 2 was ‘worth’ 19.1 times the amount of the least valuable Factor, whereas in Model 1, this multiplier was only 1.57. Both models signal improvement areas by calculating the gap between the ‘value’ and ‘health’ score of each Internal Factor – and providing a ranked priority order. However due to the underlying method of calculating Internal Factor value – the two models point to different Factors for prioritising. Simulation undertaken indicated that resources invested as directed under Model 2 would provide approximately 2.5 times the level of improvement experienced in Model 1 for the same increase in performance. Hypotheses 7 to 9 were tested using the results presented in this chapter, in all cases the alternative hypothesis was supported.

7.0 EVALUATIVE RESEARCH RESULTS

7.1 Chapter Introduction

The purpose of this chapter is to present the explanatory research results of the testing of the Strategic Health model in seven case studies of QS consulting firms. The computation of Strategic Health score and ratings of the 10 success indicators for each case (from the results of the questionnaire administered to staff of each firm) are presented together with the rank correlation analysis results between Strategic Health and each of the success indicators. The results of the tests of Hypotheses 10 to 12 are presented, addressing objective 4(a); to determine whether there is a relationship between the levels of firms' Strategic Health and success, and 4(b); to determine whether Strategic Health performance is more closely related to success than simple importance-weighted Internal Factor performance.

7.2 Outlier Identification

Due to the small sample sizes (five cases with a total of 19 respondents), the intention was to remove outliers only if absolutely to minimise data erosion. No lack of data integrity was apparent in the visual inspection of the data, so no outliers were removed.

7.3 Normality Checks

As with data from previous stages of the study, visual inspection of the data plotted on histograms suggested both normal and abnormal distributions. The results of the Kolmogorov–Smirnov and the

Shapiro-Wilk tests performed with SPSS confirmed that the data was not normally distributed, and therefore better suited to non-parametric statistical techniques (refer to section 3.6.2.6 for further discussion on this). Refer to Table 108 through to and including Table 117 in Appendix L for the full results of the normality tests.

7.4 Case Study Demographics

The purposive sampling strategy for the selection of the case study firms achieved a relatively homogenous sample – minimising the risk of confounding variables. All firms had between three and 8 employees, were privately owned NZ companies, did not have international interests (offshore offices), respondents were based in the same geographic location (Christchurch), and were focused on the building sector of the construction industry. Firms with less than three personnel in one location were excluded as these were likely to be a sole trader or small partnership rather than a small to medium sized practice. Conversely, eight was taken as the upper level cut off, as practices with eight or more staff, whilst not large for most industries, would more likely be part of larger international practices and in the New Zealand QS context be considered a ‘large’ firm.

Table 78: Case Study Firm Demographics (part 1)

| Case | Employee numbers | | | Ownership | |
|--------|------------------|-----|----|-----------|--------|
| | <3 | 3-8 | >8 | Private | Public |
| Case 1 | No | Yes | No | Yes | No |
| Case 2 | No | Yes | No | Yes | No |
| Case 3 | No | Yes | No | Yes | No |
| Case 4 | No | Yes | No | Yes | No |
| Case 5 | No | Yes | No | Yes | No |

Table 79: Case Study Firm Demographics (part 2)

| Case | Office Location | Reach | | Main Sector | |
|--------|-----------------|------------|---------------|-------------|------------|
| | | Local (NZ) | International | Vertical | Horizontal |
| Case 1 | Christchurch | Yes | No | Yes | No |

| | | | | | |
|--------|--------------|-----|----|-----|----|
| Case 2 | Christchurch | Yes | No | Yes | No |
| Case 3 | Christchurch | Yes | No | Yes | No |
| Case 4 | Christchurch | Yes | No | Yes | No |
| Case 5 | Christchurch | Yes | No | Yes | No |

7.5 Performance Results

7.5.1 Attribute Performance Results

The table below summarises the self-reported performance data in terms of the Internal Factors – of each of the firms. The highest performing firm was Case 1, the lowest performing firm was Case 2. The highest performing firm performed 17% better than the lowest, based on the total of all performance scores.

Table 80: Internal Factor Performance Scores

| Attribute | Case 1 m (s.d.) | Case 2 m (s.d.) | Case 3 m (s.d.) | Case 4 m (s.d.) | Case 5 m (s.d.) |
|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Leadership | 0.92 (0.14) | 0.83 (0.14) | 0.75 (0.35) | 0.81 (0.38) | 0.88 (0.14) |
| Market awareness | 0.83 (0.14) | 0.75 (0.00) | 0.75 (0.00) | 0.81 (0.38) | 0.94 (0.00) |
| Strategic management | 0.75 (0.25) | 0.50 (0.00) | 0.70 (0.00) | 0.58 (0.29) | 0.81 (0.00) |
| Firm flexibility | 0.92 (0.14) | 0.92 (0.14) | 0.80 (0.21) | 0.81 (0.38) | 0.94 (0.13) |
| People management | 0.92 (0.14) | 0.83 (0.14) | 0.80 (0.21) | 0.75 (0.35) | 0.69 (0.31) |
| Interpersonal skill | 0.92 (0.14) | 0.83 (0.14) | 0.75 (0.25) | 0.81 (0.24) | 0.81 (0.13) |
| Communication skill | 0.83 (0.14) | 0.75 (0.00) | 0.70 (0.00) | 0.88 (0.25) | 0.81 (0.00) |
| Rigour | 1.00 (0.00) | 0.92 (0.14) | 0.90 (0.14) | 0.81 (0.38) | 0.92 (0.14) |
| Teamwork | 1.00 (0.00) | 0.75 (0.00) | 0.75 (0.00) | 0.88 (0.25) | 0.88 (0.00) |
| Ethical conduct | 1.00 (0.00) | 1.00 (0.00) | 0.95 (0.00) | 1.00 (0.00) | 1.00 (0.00) |
| Relationship management | 1.00 (0.00) | 0.58 (0.14) | 0.85 (0.14) | 0.81 (0.24) | 0.88 (0.14) |
| Client quality | 0.92 (0.14) | 0.58 (0.14) | 0.65 (0.14) | 0.94 (0.13) | 0.88 (0.14) |
| Networks | 0.92 (0.14) | 0.50 (0.25) | 0.75 (0.25) | 0.94 (0.13) | 0.88 (0.14) |
| Brand | 0.75 (0.25) | 0.42 (0.14) | 0.55 (0.21) | 0.69 (0.24) | 0.56 (0.24) |
| International reach | 0.58 (0.14) | 0.42 (0.38) | 0.35 (0.22) | 0.75 (0.43) | 0.38 (0.25) |
| Knowledge management | 0.75 (0.25) | 0.67 (0.14) | 0.60 (0.38) | 0.69 (0.31) | 0.63 (0.25) |
| Work methods | 0.75 (0.25) | 0.75 (0.00) | 0.80 (0.00) | 0.81 (0.38) | 0.56 (0.00) |
| IT systems | 0.75 (0.25) | 0.92 (0.14) | 0.70 (0.11) | 0.69 (0.31) | 0.56 (0.13) |
| Training | 0.67 (0.14) | 0.67 (0.14) | 0.50 (0.31) | 0.75 (0.35) | 0.56 (0.24) |
| Innovation capture | 0.75 (0.25) | 0.58 (0.29) | 0.50 (0.31) | 0.69 (0.38) | 0.50 (0.20) |
| Measurement ability | 0.92 (0.14) | 0.75 (0.25) | 0.85 (0.22) | 0.94 (0.13) | 0.88 (0.14) |
| Estimating ability | 1.00 (0.00) | 0.92 (0.14) | 0.95 (0.11) | 0.94 (0.13) | 0.94 (0.13) |
| Cost control ability | 0.92 (0.14) | 0.92 (0.14) | 0.85 (0.22) | 0.92 (0.14) | 0.94 (0.13) |
| Cost knowledge | 0.92 (0.14) | 0.83 (0.14) | 1.00 (0.00) | 0.94 (0.13) | 0.94 (0.13) |

| | | | | | |
|------------------------|--------------|--------------|--------------|--------------|--------------|
| Construction knowledge | 0.92 (0.14) | 0.92 (0.14) | 0.90 (0.14) | 0.94 (0.13) | 0.88 (0.14) |
| Legal knowledge | 0.83 (0.14) | 0.67 (0.29) | 0.75 (0.00) | 0.81 (0.24) | 0.88 (0.14) |
| Total | 22.42 | 19.17 | 19.40 | 21.38 | 20.48 |
| Rescaled total | 0.86 | 0.74 | 0.75 | 0.82 | 0.79 |
| Rank | 1.0 | 5.0 | 4.0 | 2.0 | 3.0 |

7.5.2 Results of Performance of the ‘Importance’ Weighted Internal Factor Model (Model 1)

7.5.2.1 Computations

The computation of model performance is undertaken for each Internal Factor. The performance score for each IF (as presented in the previous table) is multiplied by the importance rating (as set out in section 5.2.7.1).

7.5.2.2 Results

The table below summarises the performance data of the cases in terms of Model 1 (Importance-Weighted Internal Factor Model). The highest performing firm was Case 1, the lowest performing firm was Case 2. The highest performing firm performed 16.6% better than the lowest, based on the total of all performance scores.

Table 81: Model 1 Internal Factor Performance Scores

| Attribute | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 |
|-------------------------|--------|--------|--------|--------|--------|
| Leadership | 0.72 | 0.65 | 0.59 | 0.64 | 0.68 |
| Market awareness | 0.68 | 0.62 | 0.62 | 0.67 | 0.77 |
| Strategic management | 0.58 | 0.39 | 0.54 | 0.45 | 0.63 |
| Firm flexibility | 0.76 | 0.76 | 0.66 | 0.67 | 0.78 |
| People management | 0.73 | 0.66 | 0.63 | 0.59 | 0.54 |
| Interpersonal skill | 0.78 | 0.71 | 0.64 | 0.69 | 0.69 |
| Communication skill | 0.74 | 0.66 | 0.62 | 0.77 | 0.72 |
| Rigour | 0.92 | 0.85 | 0.83 | 0.75 | 0.85 |
| Teamwork | 0.84 | 0.63 | 0.63 | 0.73 | 0.73 |
| Ethical conduct | 0.92 | 0.92 | 0.88 | 0.92 | 0.92 |
| Relationship management | 0.87 | 0.51 | 0.74 | 0.71 | 0.77 |

| | | | | | |
|------------------------|--------------|--------------|--------------|--------------|--------------|
| Client quality | 0.74 | 0.47 | 0.52 | 0.75 | 0.70 |
| Networks | 0.75 | 0.41 | 0.62 | 0.77 | 0.72 |
| Brand | 0.56 | 0.31 | 0.41 | 0.51 | 0.42 |
| International reach | 0.38 | 0.27 | 0.23 | 0.49 | 0.24 |
| Knowledge management | 0.61 | 0.54 | 0.49 | 0.56 | 0.51 |
| Work methods | 0.63 | 0.63 | 0.67 | 0.68 | 0.47 |
| IT systems | 0.55 | 0.67 | 0.51 | 0.50 | 0.41 |
| Training | 0.56 | 0.56 | 0.42 | 0.63 | 0.47 |
| Innovation capture | 0.57 | 0.44 | 0.38 | 0.52 | 0.38 |
| Measurement ability | 0.78 | 0.64 | 0.73 | 0.80 | 0.75 |
| Estimating ability | 0.93 | 0.86 | 0.89 | 0.88 | 0.88 |
| Cost control ability | 0.82 | 0.82 | 0.76 | 0.82 | 0.84 |
| Cost knowledge | 0.78 | 0.71 | 0.85 | 0.80 | 0.80 |
| Construction knowledge | 0.77 | 0.77 | 0.76 | 0.79 | 0.74 |
| Legal knowledge | 0.69 | 0.55 | 0.62 | 0.67 | 0.72 |
| Total | 18.64 | 15.99 | 16.21 | 17.76 | 17.11 |
| Rescaled total | 0.87 | 0.74 | 0.75 | 0.83 | 0.80 |
| Rank | 1.0 | 5.0 | 4.0 | 2.0 | 3.0 |

7.5.3 Results of Performance of the ‘Internal-External Factor Match’ Weighted Internal Factor (Strategic Health) Model (Model 2)

7.5.3.1 Computations

The computation of model performance is undertaken for each Internal Factor. The performance score for each IF (as presented in the previous table) is multiplied by the importance rating (as set out in section 5.2.7.1).

7.5.3.2 Results

The table below summarises the performance data of the cases in terms of Model 2 (Strategic Health Model). The highest performing firm was Case 1, the lowest performing firm was Case 2. The highest performing firm performed 11.6% better than the lowest, based on the total of all performance scores.

Table 82: Model 2 Internal Factor Performance Scores

| Attribute | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 |
|-------------------------|--------------|--------------|--------------|--------------|--------------|
| Leadership | 0.005 | 0.005 | 0.004 | 0.005 | 0.005 |
| Market awareness | 0.042 | 0.038 | 0.038 | 0.041 | 0.047 |
| Strategic management | 0.032 | 0.022 | 0.030 | 0.025 | 0.035 |
| Firm flexibility | 0.030 | 0.030 | 0.026 | 0.026 | 0.030 |
| People management | 0.007 | 0.007 | 0.006 | 0.006 | 0.005 |
| Interpersonal skill | 0.030 | 0.027 | 0.024 | 0.026 | 0.026 |
| Communication skill | 0.020 | 0.018 | 0.017 | 0.021 | 0.019 |
| Rigour | 0.005 | 0.004 | 0.004 | 0.004 | 0.004 |
| Teamwork | 0.013 | 0.010 | 0.010 | 0.012 | 0.012 |
| Ethical conduct | 0.021 | 0.021 | 0.020 | 0.021 | 0.021 |
| Relationship management | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Client quality | 0.039 | 0.025 | 0.028 | 0.040 | 0.037 |
| Networks | 0.067 | 0.036 | 0.055 | 0.068 | 0.064 |
| Brand | 0.029 | 0.016 | 0.021 | 0.026 | 0.021 |
| International reach | 0.017 | 0.012 | 0.010 | 0.022 | 0.011 |
| Knowledge management | 0.025 | 0.022 | 0.020 | 0.022 | 0.020 |
| Work methods | 0.025 | 0.025 | 0.027 | 0.027 | 0.019 |
| IT systems | 0.043 | 0.052 | 0.040 | 0.039 | 0.032 |
| Training | 0.058 | 0.058 | 0.044 | 0.065 | 0.049 |
| Innovation capture | 0.060 | 0.046 | 0.040 | 0.055 | 0.040 |
| Measurement ability | 0.011 | 0.009 | 0.010 | 0.011 | 0.011 |
| Estimating ability | 0.023 | 0.021 | 0.022 | 0.022 | 0.022 |
| Cost control ability | 0.049 | 0.049 | 0.045 | 0.049 | 0.050 |
| Cost knowledge | 0.053 | 0.048 | 0.058 | 0.054 | 0.054 |
| Construction knowledge | 0.057 | 0.057 | 0.056 | 0.058 | 0.054 |
| Legal knowledge | 0.070 | 0.056 | 0.063 | 0.069 | 0.074 |
| Total | 0.830 | 0.714 | 0.717 | 0.814 | 0.763 |
| Rescaled total | 0.83 | 0.71 | 0.72 | 0.81 | 0.76 |
| Rank | 1.0 | 5.0 | 4.0 | 2.0 | 3.0 |

7.6 Success Indicator Results

The table below summarises the self-reported performance data of the cases in terms of the Success measures tested. The highest performing firm was Case 1, the lowest performing firm was Case 2. The highest performing firm performed 16% better than the lowest, based on the total of all performance scores.

Table 83: Success Indicator Performance Scores

| Attribute | Case 1 m (s.d.) | Case 2 m (s.d.) | Case 3 m (s.d.) | Case 4 m (s.d.) | Case 5 m (s.d.) |
|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Repeat business | 0.61 (0.10) | 0.56 (0.10) | 0.53 (0.07) | 0.63 (0.08) | 0.63 (0.08) |
| Client feedback | 0.61 (0.10) | 0.50 (0.00) | 0.47 (0.00) | 0.58 (0.17) | 0.54 (0.00) |
| Employee retention | 0.56 (0.10) | 0.61 (0.10) | 0.50 (0.12) | 0.54 (0.16) | 0.58 (0.10) |
| Employee satisfaction | 0.56 (0.10) | 0.50 (0.00) | 0.53 (0.00) | 0.50 (0.24) | 0.58 (0.00) |
| Fee | 0.61 (0.10) | 0.50 (0.00) | 0.53 (0.00) | 0.54 (0.16) | 0.50 (0.00) |
| Operations | 0.61 (0.10) | 0.39 (0.10) | 0.47 (0.18) | 0.54 (0.16) | 0.50 (0.00) |
| Workload growth | 0.94 (0.10) | 0.83 (0.17) | 0.90 (0.15) | 0.96 (0.08) | 0.92 (0.10) |
| Employee number growth | 0.94 (0.10) | 0.83 (0.17) | 0.93 (0.15) | 0.88 (0.16) | 0.88 (0.08) |
| Client base growth | 0.89 (0.10) | 0.78 (0.10) | 0.87 (0.30) | 0.89 (0.19) | 0.83 (0.14) |
| Overall success | 0.56 (0.10) | 0.44 (0.10) | 0.58 (0.10) | 0.54 (0.16) | 0.61 (0.10) |
| Total | 6.89 | 5.94 | 6.32 | 6.60 | 6.57 |
| Rescaled total | 0.69 | 0.59 | 0.63 | 0.66 | 0.66 |
| Rank | 1.0 | 5.0 | 4.0 | 2.0 | 3.0 |

7.6.1 Success Measure Reliability Check

Cronbach's alpha was used to measure the internal consistency (reliability) of the proxies selected to measure firms' success. Cronbach's alpha was tested using SPSS, producing an alpha of 0.900. Based on the interpretation guidelines provided by Mallery and George (2019), the internal consistency of the selected measures sits on the threshold between 'good' and 'excellent'. It can therefore be concluded that these measures are all related to the same underlying variable.

Table 84: Cronbach's Alpha Interpretation (Mallery & George, 2019)

| Internal Consistency | Value |
|----------------------|-----------|
| Excellent | >0.9 |
| Good | 0.8 – 0.9 |
| Acceptable | 0.7 - 0.8 |
| Questionable | 0.6 – 0.7 |
| Poor | 0.5 – 0.6 |
| Unacceptable | <0.5 |

The table below presents the inter-item correlation produced by the Cronbach test. The correlations indicate the strength of the relationship – or consistency – between pairs of success measures. Particularly strong correlations were observed between repeat business and client feedback (0.742);

employee retention and employee satisfaction (0.789); employee satisfaction and overall success (0.861); revenue and overall success (0.716); workload growth and employee number growth (0.915), client base growth (0.716), and overall success (0.714); employee number growth and client base growth (0.824), and; client base growth and overall success (0.763).

Table 85: Cronbach's Alpha – Inter-Item Correlation Matrix

| Success measure | Repeat business | Client feedback | Employee retention | Employee satisfaction | Revenue | Operations | Workload growth | Employee number growth | Client base growth | Overall success |
|------------------------|-----------------|-----------------|--------------------|-----------------------|---------|------------|-----------------|------------------------|--------------------|-----------------|
| Repeat business | 1.000 | 0.742 | 0.243 | 0.385 | 0.384 | 0.305 | 0.114 | 0.000 | 0.180 | 0.447 |
| Client feedback | 0.742 | 1.000 | 0.386 | 0.653 | 0.638 | 0.420 | 0.254 | 0.219 | 0.419 | 0.593 |
| Employee retention | 0.243 | 0.386 | 1.000 | 0.723 | 0.683 | 0.296 | 0.000 | -0.056 | 0.283 | 0.461 |
| Employee satisfaction | 0.385 | 0.653 | 0.723 | 1.000 | 0.789 | 0.528 | 0.461 | 0.442 | 0.657 | 0.861 |
| Revenue | 0.384 | 0.638 | 0.683 | 0.789 | 1.000 | 0.689 | 0.306 | 0.264 | 0.506 | 0.716 |
| Operations | 0.305 | 0.420 | 0.296 | 0.528 | 0.689 | 1.000 | 0.243 | 0.233 | 0.474 | 0.454 |
| Workload growth | 0.114 | 0.254 | 0.000 | 0.461 | 0.306 | 0.243 | 1.000 | 0.915 | 0.716 | 0.714 |
| Employee number growth | 0.000 | 0.219 | -0.056 | 0.442 | 0.264 | 0.233 | 0.915 | 1.000 | 0.824 | 0.693 |
| Client base growth | 0.180 | 0.419 | 0.283 | 0.657 | 0.506 | 0.474 | 0.716 | 0.824 | 1.000 | 0.763 |
| Overall success | 0.447 | 0.593 | 0.461 | 0.861 | 0.716 | 0.454 | 0.714 | 0.693 | 0.763 | 1.000 |

As indicated in the Item-Total Statistics table below, only two measures would increase overall alpha if removed: 'repeat business' (from 0.900 to 0.902) and 'employee retention' (from 0.900 to 0.901). Both are minimal increases so exclusion purely on statistical terms may not be warranted.

Table 86: Cronbach's Alpha – Item-Total Statistics

| Success measure | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|------------------------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| Repeat business | 44.43 | 21.648 | 0.414 | 0.797 | 0.902 |
| Client feedback | 44.71 | 19.451 | 0.645 | 0.831 | 0.890 |
| Employee retention | 44.64 | 21.016 | 0.451 | 0.846 | 0.901 |
| Employee satisfaction | 44.79 | 17.720 | 0.864 | 0.932 | 0.873 |
| Revenue | 44.71 | 19.604 | 0.776 | 0.881 | 0.883 |
| Operations | 44.86 | 19.824 | 0.548 | 0.723 | 0.897 |
| Workload growth | 42.43 | 20.110 | 0.580 | 0.878 | 0.894 |
| Employee number growth | 42.36 | 20.247 | 0.559 | 0.949 | 0.895 |
| Client base growth | 42.64 | 17.940 | 0.758 | 0.863 | 0.882 |

| | | | | | |
|-----------------|-------|--------|-------|-------|-------|
| Overall success | 44.79 | 18.335 | 0.906 | 0.943 | 0.872 |
|-----------------|-------|--------|-------|-------|-------|

7.7 Strategic Health Model Test Results

7.7.1 Model Score and Success Correlation Tests

As discussed in the Research Methods chapter, SRCC was selected to test the strength of relationship between the model scores and the indicators of success. The predefined alpha level for significance was set at 0.10, slightly higher than the typical default 0.05. As recommended by Gallo (2016), the alpha should be adjusted to reflect the test subject and resultant decision making. For instance, detailed physics experiments might require a 0.00001 p-value, whereas business decisions selecting between two options would be willing to accept a much higher value up to 0.25. For the following tests, which seek to establish whether a relationship exists between performance and success, a predefined alpha of 0.10 was selected.

7.7.2 Correlation between Model 1 Performance of Internal Factors and Success Measures

Five out of the ten measures of success were found to correlate with performance in terms of Model 1; these are positive client feedback, the ability to attract a relatively high revenue, efficient operations, workload growth, and growth of client base. The highest success measure correlation with performance was operations (1.000 – perfectly correlated), followed by workload growth and client feedback (0.900), client base growth (0.872, and lastly, revenue (0.821). The success measures of repeat business, employee satisfaction, employee retention, employee number growth, and overall success were not found to correlate with the performance results of Model 1.

Iterative tests of model sensitivity, achieved by progressive introduction of one Internal Factor to the model at a time (in descending order of importance), found that 11 Internal Factors are required to be considered before there is no further improvement to the correlation results.

Full results of the Spearman's Rank Correlation test are provided in Appendix M.

Table 87: Model 1 Test: Spearman's Rank Correlation Coefficient

| Attribute | Repeat business (S1) | Client feedback (S2) | Employee rete... (S3) | Employee sat... (S4) | Revenue (S5) | Operations (S6) | Workload gro... (S7) | Employee nu... (S8) | Client base gr... (S9) | Overall success (S10) | Total |
|--|----------------------|----------------------|-----------------------|----------------------|--------------|-----------------|----------------------|---------------------|------------------------|-----------------------|--------------|
| Top Internal Factor | | | | | | | | 1.000 | | | 1.000 |
| Top 2 Internal Factors | | | | 0.872 | | | | | | | 0.872 |
| Top 3 Internal Factors | | | | | | | | | | | 0.000 |
| Top 4 Internal Factors | | | | | | | | | | | 0.000 |
| Top 5 Internal Factors | | 0.900 | | | | | | | | | 0.900 |
| Top 6 Internal Factors | | | | | | 0.900 | | | | | 0.900 |
| Top 7 Internal Factors | | | | | | 0.900 | | | | | 0.900 |
| Top 8 Internal Factors | | | | | | 0.900 | | | | | 0.900 |
| Top 9 Internal Factors | | | | | | 0.900 | | | | | 0.900 |
| Top 10 Internal Factors | | | | | | 0.900 | | | | | 0.900 |
| Top 11 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 12 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 13 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 14 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 15 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 16 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 17 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 18 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 19 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 20 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 21 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 22 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 23 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 24 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 25 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 26 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Predefined alpha for significance = 0.10 | | | | | | | | | | | |

7.7.3 Correlations between Model 2 (Strategic Health Model) and Success Measures

As for Model 1, the same five of the ten measures of success were found to correlate with performance in terms of Model 2. The highest success measure correlation with performance again was operations (1.000 – perfectly correlated), followed by workload growth and client feedback (0.900), client base growth (0.872, and lastly, revenue (0.821). Also, as for Model 1, the success measures of repeat business, employee satisfaction, employee retention, employee number growth, and overall success were not found to correlate with the performance results of Model 2.

Iterative tests of model sensitivity, achieved by progressive introduction of one Internal Factor to the model at a time (in descending order of importance), found that 10 Internal Factors are required to be considered before there is no further improvement to the correlation results.

Full results of the Spearman's Rank Correlation test are included **Error! Reference source not found.** in Appendix N.

Table 88: Model 2 Test: Spearman's Rank Correlation Coefficient

| Attribute | Repeat business (S1) | Client feedback (S2) | Employee rete... (S3) | Employee sat... (S4) | Revenue (S5) | Operations (S6) | Workload gro... (S7) | Employee nu... (S8) | Client base gr... (S9) | Overall success (S10) | Total |
|--------------------------------|----------------------|----------------------|-----------------------|----------------------|--------------|-----------------|----------------------|---------------------|------------------------|-----------------------|--------------|
| Top Internal Factor | | | | | | | | | | | 0.000 |
| Top 2 Internal Factors | 0.821 | 0.900 | | | | | 0.900 | | | | 2.621 |
| Top 3 Internal Factors | 0.821 | 0.900 | | | | | 0.900 | | | | 2.621 |
| Top 4 Internal Factors | | | | | | 0.900 | 1.000 | | 0.872 | | 2.772 |
| Top 5 Internal Factors | | | | | | 0.900 | 1.000 | | 0.872 | | 2.772 |
| Top 6 Internal Factors | | | | | | 0.900 | 1.000 | | 0.872 | | 2.772 |
| Top 7 Internal Factors | | | | | | 0.900 | 1.000 | | 0.872 | | 2.772 |
| Top 8 Internal Factors | 0.821 | 0.900 | | | | | 0.900 | | | | 2.621 |
| Top 9 Internal Factors | | 1.000 | | | | 0.900 | | | | | 1.900 |
| Top 10 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 11 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 12 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 13 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 14 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |

| | | | | | | | | | | | |
|--|--|-------|--|--|-------|-------|-------|--|-------|--|-------|
| Top 15 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 16 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 17 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 18 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 19 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 20 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 21 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 22 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 23 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 24 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 25 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Top 26 Internal Factors | | 0.900 | | | 0.821 | 1.000 | 0.900 | | 0.872 | | 4.493 |
| Predefined alpha for significance = 0.10 | | | | | | | | | | | |

7.8 Hypotheses Tests

7.8.1 Test of Hypothesis 10

Hypothesis 10 was proposed to test whether there is a positive correlation between firms' relative levels of modelled 'health' (as modelled using the 'perceived importance-based' model) and 'success'. The 'relative levels of modelled health' is the independent variable, and 'success' is the dependent variable.

Where the level of firms' 'health' as diagnosed by the 'perceived importance-based' model is $H1$ and the level of firms' 'success' according to the i^{th} success measure is S_i , and the correlation between $H1$ and S_i is $H1-S_i^{Correl}$ then the null and alternative hypotheses were defined as:

H10₀: $H1-S_i^{Correl}$ is zero

H10₁: $H1-S_i^{Correl}$ is positive or negative (greater or smaller than zero)

Spearman's Rank Correlation Coefficient was selected to assess the strength of the relationship between two variables of rank ordered data. The predefined alpha level was set for 0.10.

The results of the Spearman's Rank Correlation Coefficient test for each combination firms' 'health' with each of the 'success' scores are presented in Table 87 of section 7.7. The results show a statistically significant Spearman's rho exists for 5 of 10 variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

7.8.2 Test of Hypothesis 11

Hypothesis 11 was proposed to test whether there is a positive correlation between firms' relative levels of modelled 'health' (as modelled using the 'External Force-matched' model) and 'success'. The 'relative levels of modelled health' is the independent variable, and 'success' is the dependent variable.

Where the level of firms' 'strategic health' as diagnosed by the 'External Force-matched' model is $H2$ and the level of firms' 'success' according to the i^{th} success measure is S_i and the correlation between $H2$ and S_i is $H2-S_i^{Correl}$ then the null and alternative hypotheses were defined as:

H11₀: $H2-S_i^{Correl}$ is zero

H11₁: $H2-S_i^{Correl}$ is positive or negative (greater or smaller than zero)

Spearman's Rank Correlation Coefficient was selected to assess the strength of the relationship between two variables of rank ordered data. As above, the predefined alpha level was set for 0.10.

The results of the Spearman's Rank Correlation Coefficient test for each combination firms' 'health' with each of the 'success' scores are presented in Table 88 of section 7.7. The results show a statistically significant Spearman's rho exists for 5 of 10 variables. Therefore, the null hypothesis is rejected, and the alternative hypothesis is supported.

7.8.3 Test of Hypothesis 12

Hypothesis 12 was proposed to test whether there is a closer relationship between the ‘External Force-matched’ model (**H2**) level of ‘strategic health’ and success than between the ‘perceived importance-based’ model (**H1**) level of ‘health’ and success.

The null and alternative hypotheses were defined as:

H12₀: $H2-S_i^{Correl}$ is not greater than $H1-S_i^{Correl}$

H12₁: $H2-S_i^{Correl}$ is greater than $H1-S_i^{Correl}$

The presence of a variance between the results for the tests for Hypotheses 9 and 10 was selected to test this hypothesis.

The results of the two tests for Hypotheses 10 and 11 are presented in Table 87 and Table 88 of section 7.7. The results show that correlations exist for five of the ten variables for both models. Closer inspection reveals that those five correlations are achieved in Model 2 by consideration of the top ten variables, whereas in Model 1, the same level of correlation is only achieved after the introduction of the 11th variable into the model. Model 2 therefore exhibits a more sensitive (stronger) relationship to the tested success measures than Model 1. The null hypothesis is therefore rejected, and the alternative hypothesis is supported.

7.9 Chapter Summary

This chapter set out to determine whether there is a relationship between the levels of firms’ Strategic Health and success, and; whether Strategic Health performance is more closely related to success than simple importance-weighted Internal Factor performance. Testing of the success measures using Cronbach’s alpha determined that the selected success measures have ‘good’ to ‘excellent’ internal

consistency. The Hypothesis tests found that correlations do exist between five of the 10 success measures and both Model 1 and Model 2. Closer inspection revealed that those five correlations are achieved in Model 2 by consideration of the top ten variables, whereas in Model 1, the same level of correlation is only achieved after the introduction of the 11th variable into the model. Model 2 was therefore said to have the stronger relationship to the tested success measures than Model 1. The alternative hypotheses for Hypotheses 10 to 12 were supported.

8.0 DISCUSSION AND CONCLUSION

8.1 Chapter Introduction

This chapter discuss the results of the research and highlights the implications of the conclusions drawn. The main findings relating to each objective are summarised and their importance is discussed. The findings are contrasted and compared to the extant literature, the supporting methodologies and evidence are described and their contribution to knowledge is articulated. The answers to each of the driving research questions are provided. Limitation of the findings are discussed as are the implications of the findings for theory, practice, and future research.

8.2 Main Findings

8.2.1 Key Situation Analysis Factors

8.2.1.1 Discussion

The first two objectives of the study were to identify the key Internal Factors that should be considered in QS firms' strategic planning process (1(a)), and; to identify the key External Factors that should be considered in QS firms' strategic planning process (1(b)). Together, these objectives address the first research question.

The research identified 28 key External Factors and 26 key Internal Factors to be considered in a situation analysis. For brevity, the individual Factors are not repeated here (refer to section 4.5 for the full list).

External Factors were found to naturally fall into five categories; 'outside' forces, 'substitute' forces, 'supply side' forces, 'demand side' forces, and 'inside' forces. Outside forces described the External Factors that originate from, or exist, 'outside' the of the traditional or existing QS environment.

Substitute Forces are those that have the potential to replace all or part of the services currently provided by quantity surveyors. ‘Supply Side’ External Factors are those that feed into QS firms, which firms are dependent on and cannot control. These ‘Demand Side’ Forces are those External Factors that generate demand for quantity surveying services. ‘Inside’ Forces, while external to the firm, are those External Factors that are internal to the profession – meaning the profession as a collective has some control or influence over these but individual firms do not.

Internal Factors were also clustered into five groupings to provide an overview; ‘management’ attributes, ‘people’ attributes, ‘network and marketing’ attributes, ‘practice and process’ attributes, and ‘core competency’ attributes. ‘Management’ attributes are those Internal Factors that are generally under the control of those responsible for the management of the firm. The role ‘people’ play to the organisation’s success was a common theme; the ‘People’ Factors summarize the main qualities considered important for individual QS’s to hold. ‘Network and Marketing’ attributes are those Internal Factors that focus on representing the firm and building its profile among external stakeholders. ‘Practice and Process’ attributes are those Internal Factors look inward at how the firm goes about service delivery and the tools, systems and processes in place to support this. ‘Core Competency’ attributes are those Internal Factors that deal with the core technical competencies required of a QS firm.

The 28 External Factors and 26 Internal Factors are based on the analysis of the in-depth semi-structured interviews undertaken with 15 key leaders of the QS profession. Of all the existing generic frameworks in the literature for assessing the external operating environment of organisations, these groupings are essentially an application of Porter’s Five Forces for competitive analysis, (Gillespie, 2019; Michael E. Porter, 2008). The table below compares the two frameworks:

Table 89: External Factor Categories Aligned with Porter’s Five Forces

| Porter's Five Forces | External Factor Categories | Description |
|---|----------------------------|---|
| Threat of New Entrants | Outside forces | External Factors that originate from, or exist, 'outside' the of the traditional or existing QS environment. |
| Bargaining Power of Buyers | Demand side forces | External Factors that generate demand for quantity surveying services |
| Threat of Substitute Products or Services | Substitute forces | External Factors that have the potential to replace all or part of the services currently provided by quantity surveyors |
| Bargaining Power of Suppliers | Supply side forces | External Factors that feed into QS firms, which firms are dependent on but cannot directly control |
| Rivalry Among Existing Competitors | Inside Forces | Factors that are external to the firm but internal to the profession – meaning the profession as a collective has some control or influence over these but individual firms do not. |

Though first appearing over 40 years ago, Porter's Five Forces remains relevant and applicable in the strategic management literature of today (Gillespie, 2019; Michael E. Porter, 2008). Between four and seven factors relevant to each of the categories were identified in this study – indicating a good coverage of the key forces in the external environment was achieved.

Eight themes were identified from the literature as key areas impacting on the success of QS firms. The table illustrates the inclusion of these thematic areas within the developed Situation Analysis framework.

Table 90: Alignment of Literature Review Themes and Situation Analysis Factors

| Key Literature Review Themes | Related Situation Analysis Factors |
|---|--|
| Core skills and competencies (Chamikara et al., 2020; Chandramohan et al., 2020; J. O. Dada, 2017; Nkado & Meyer, 2001; Ayodeji Emmanuel Oke et al., 2019; A. E. Oke et al., 2018; Yogeshwaran et al., 2018) | 2.5.1: Measurement and quantification skills 2.5.2: Estimating, cost planning and value and financial risk management skills 2.5.3: Project financial administration, reporting and control skills 2.5.4: Cost knowledge (rates, labour constants, market changes) 2.5.5: Construction knowledge (technical, methodology, materials, risks) 2.5.6: Regulatory, legal and contractual knowledge and risk awareness |
| Knowledge management (Alauddin et al., 2019; Davis et al., 2007; Mohamed et al., 2018; Mustapa et al., 2012) | 1.2.5: Publicly available construction cost data 1.5.3: The current level of profession-wide collaboration on knowledge and data sharing and research 2.4.1: Knowledge capture and management systems (databases) |
| Innovation and technology (Anh Nguyen et al., 2020; Babatunde et al., 2018; Gunawardhana et al., 2019; Hardie et al., 2005; Harrison & Thurnell, 2015; Ibironke et al., 2011; Jabar et al., 2020; Kehily & Underwood, | 1.2.1: IT advances with the potential to replace some of the more process-oriented aspects of QS work 1.3.3: IT advances that promise more efficient ways of working (such as Building Information Modelling) |

| | |
|--|---|
| 2017; Llale et al., 2020; Mahamadu et al., 2020; Matipa et al., 2008; Mayouf et al., 2019; Nadeem et al., 2015; Ooi, 2018; Selinger & Stamler, 1983; Smith, 2004; Soon et al., 2019; Tan Chin & Yeoh Kah, 2012; Yaakob et al., 2019) | 2.4.2: Efficient and reliable work methods (tools and templates) 2.4.3: State of the art information technology systems 2.4.5: Channels for capturing innovation and creativity |
| Human resource management and employee engagement (Adeyemi & Oke, 2020; A. E. Oke et al., 2017; Tan Chin et al., 2018; van Eck & Burger, 2019) | 1.3.2: The availability of suitably skilled, qualified and experienced practitioners 2.1.5: Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc). |
| Globalisation and internationalisation (Hisham et al., 2019; C. Wang et al., 2017) | 1.4.7: International demand for local QS service providers (particularly from other regions experiencing stronger economic growth) 1.5.5: The increasing number and size of 'large' QS firms 2.3.5: International presence or connections (with clients, suppliers and partners/peers) |
| Competition and the blurring boundaries of professions and market sectors (N. Z. Abidin et al., 2014; Adesi et al., 2019; Chamikara et al., 2020; Harun & Torrance, 2006; Jagun, 2006; Kamarazaly et al., 2019; Nazif et al., 2020; Ofori & Toor, 2012; Ogunsina et al., 2018; Olawumi & Ayegun, 2016; Seah, 2009) | 1.1.1: Blurring boundaries with associated construction services (such engineers or project/facilities/asset managers) 1.1.2: Blurring market boundaries with non-construction professionals (lawyers, accountants, management consultants, financial services providers) 1.1.3: Demand from the non-building sectors of the construction industry (such as construction of mining, energy or transport infrastructure) 1.1.4: Demand from other industries (e.g.: manufacturing, events, healthcare, or disaster relief) 1.1.5: Demand for emerging environmental services (e.g.: carbon accounting, environmental economics, sustainability audits) 1.1.6: The barriers to entry for new competitors (such as professional registration, requisite knowledge, technology etc.) |
| Education, training and continual professional development (Joshua Oluwasuji Dada & Jagboro, 2018; Fortune & Skitmore, 1994; Harrison & Thurnell, 2015; F. Hassan et al., 2011; Nazif et al., 2020; Olatunji et al., 2010; Perera et al., 2013; Tan et al., 2017) | 1.3.1: The style and quality of QS qualifications offered by tertiary education institutions 1.5.1: The quality of continuing professional development (CPD) programs offered by QS institutes 2.4.4: Training and up-skilling initiatives |
| Recognition and marketing (Frei & Mbachu, 2009; Ogunsina et al., 2018; Pheng & Ming, 1997; Smith, 2004) | 1.4.2: The current level of recognition of - and demand for - QS services from private sector clients 1.4.3: The current level of recognition of - and demand for - QS services from government / public sector 1.4.4: The current level of recognition of - and demand for - QS services from associated professions (architects / project managers) 1.4.5: The current level of recognition of - and demand for - QS services from building contractors (and subcontractors) 1.4.6: The quantity surveyor's typical position on the construction supply chain (proximity to client) 1.5.2: The quality of marketing and profile building initiatives by QS institutes 2.3.4: Active marketing and brand promotion |

The presence of these themes in the framework confirms that the key impacts of QS firm success were present in the data generated through the in-depth interviews. The additional External Factors uncovered in the study that don't fall within the existing themes present in the literature are:

- 1.2.2: Construction contracts or procurement approaches that require less QS involvement (e.g. turnkey design & build)
- 1.2.3: Lead consultants (architects or project managers) who manage projects (in whole or in part) without independent QS involvement
- 1.2.4: Developers and clients with their own cost management resources
- 1.3.4: The quality of design and information produced by other consultants (designers, project managers, etc)
- 1.4.1: Fluctuations in demand due to the cyclical nature of the construction industry
- 1.5.4: The impact of QS practices which choose to compete on cost rather than quality (fee cutting)
- 1.5.6: The current lifecycle stage of the traditional QS industry (growth or decline)

Additional Internal Factors uncovered in this study and included in the Situation Analysis framework are:

- 2.1.1: Effective leadership
- 2.1.2: Acute awareness of trends and changes in the marketplace
- 2.1.3: Formulation and implementation of strategic actions
- 2.1.4: Flexible and adaptable organisational structure

- 2.2.1: Interpersonal and relationship building skills, emotional intelligence
- 2.2.2: Communication, presentation and negotiation skills
- 2.2.3: Accuracy, credibility and reliability
- 2.2.4: Leadership and teamwork attributes
- 2.2.5: Honesty, trustworthiness and impartiality (ethical conduct)
- 2.3.1: Identification and relationship management of key clients
- 2.3.2: High quality client-base
- 2.3.3: Extensive industry-wide networks (across clients, suppliers and partners/peers)

8.2.1.2 Conclusion

In conclusion, this research has uncovered the main External and Internal Factors relevant to QS firms. These are summarised in a framework of 28 External Factors and 26 Internal Factors, each clustered under five External and Internal groupings respectively.

These findings are important as they provide a guiding framework for those tasked with strategic planning in QS firms. It was noted in the literature that when strategic planning was undertaken in QS firms, it tended to be framework-based (Murphy, 2012, 2016). The extent that this framework of Factors can be generalised to ANZ QS firms is limited to the extent that the views of the interview respondents are representative of QS firms generally. Care was taken to select a broad sample of respondents.

It was noted in the literature that there is a lack of frameworks and tools available to managers for strategic planning generally (Horwath, 2019; Kabacoff, 2014), and the lack of research specifically

focussed on the QS context (O'Brien et al., 2014) indicates that this is likely to be particularly true for QS firms

This stage of the research provided a framework of Factors for both the internal and external components of a situation analysis for QS firms. The external component could be thought of as a 'five forces' checklist contextualised for QS firms.

8.2.2 Measures of Success

8.2.2.1 Discussion

Objective 1(c) was to establish how QS firms measure success. This was required in order to provide a framework of measures to test the efficacy of the developed models against. The study found that the primary measures of success are financial; that is sustainable long-terms profit and growth. Non-owner stakeholder satisfaction was found to be a secondary measure of success but only to the extent that it did not disrupt the primary measure.

These findings are in line with the literature which consistently points to financial metrics measuring business profit and growth as the primary benchmarks of business success (Bogetoft, 2012; Deac, 2018; Holland & Matthews, 2018; Korsager, 2019; La Rosa, 2021; McLaney, 2016). These findings are based on the analysis of the in-depth semi-structured interviews undertaken with 15 key leaders of the QS profession.

8.2.2.2 Conclusion

The definition of the success measures enabled the formulation of measures for validating the research models. As per the previous item the limitations of these findings are the representativeness of the

interview sample. This was mitigated by also undertaking a literature review to investigate how for-profit firms measure success – which as discussed above, support these findings.

8.2.3 Weighting of External and Internal Factors

8.2.3.1 Discussion

Objective 2(a) and 2(b) build on objectives 1(a) and 1(b) respectively. Objective 2(a) sets out to quantify the perceived impact of the established External Factors in the operating environment and objective 2(b) seeks to quantify the importance placed on the Internal Factors in view of the state the External Factors at the same time. These weightings were required in order to develop the Factor framework into a quantitative model – the third research aim. The weightings also enable closer examination of the different perspectives of QS firm stakeholders (discussed further in the following sections).

Importance weighting of the Internal Factors found that all Internal Factors were considered to be above ‘average’ importance. In the Follow-up Observation, 16 were considered ‘extremely important’, nine were considered ‘highly important’, and only one was ‘moderately important’. The spread between Internal Factor weightings was fairly narrow; the top ten factors were only differentiated by a spread of 8%, and the most important factor (ethical conduct) was only 57% more important than the least (international reach). In practice, this could make the prioritisation of resources for investment in Internal Factors difficult as the difference in importance is not significantly clear.

In terms of External Factors, nineteen of 28 were considered opportunities, and 9 were considered threats. The top three opportunities in descending order were the level of recognition and demand for services from the public sector, IT advances that promised more efficient ways of working, and recognition and demand from associated professionals. The largest threats were perceived to be price

competition (QS firms who take a cost leadership approach to competing), lead consultants (architects or project manager who manage without QS involvement) and developers and client organisations with in-house QS's.

This study is the first one to provide quantitative ratings of the developed Situation Analysis Factor, so direct quantitative comparisons between these findings and other studies is not possible. therefore, little can be said about the ratings in light of existing literature.

A notable observation however is the relatively low weighting attributed to the Factors that address the key themes in the literature; particularly regarding the Internal Factors. None of the top ten Internal Factors dealt with:

- technology and innovation (Anh Nguyen et al., 2020; Babatunde et al., 2018; Gunawardhana et al., 2019; Hardie et al., 2005; Harrison & Thurnell, 2015; Ibironke et al., 2011; Jabar et al., 2020; Kehily & Underwood, 2017; Llale et al., 2020; Mahamadu et al., 2020; Matipa et al., 2008; Mayouf et al., 2019; Nadeem et al., 2015; Ooi, 2018; Selinger & Stamler, 1983; Smith, 2004; Soon et al., 2019; Tan Chin & Yeoh Kah, 2012; Yaakob et al., 2019);
- knowledge management (Alauddin et al., 2019; Davis et al., 2007; Mohamed et al., 2018; Mustapa et al., 2012);
- education, training and CPD (N. Z. Abidin et al., 2014; Adesi et al., 2019; Chamikara et al., 2020; Harun & Torrance, 2006; Jagun, 2006; Kamarazaly et al., 2019; Nazif et al., 2020; Ofori & Toor, 2012; Ogunsina et al., 2018; Olawumi & Ayegun, 2016; Seah, 2009);
- marketing (Frei & Mbachu, 2009; Ogunsina et al., 2018; Pheng & Ming, 1997; Smith, 2004),
or;

- people management (Adeyemi & Oke, 2020; A. E. Oke et al., 2017; Tan Chin et al., 2018; van Eck & Burger, 2019).

The focus seemed to be more on the skills and competency type attributes (Chamikara et al., 2020; Chandramohan et al., 2020; J. O. Dada, 2017; Nkado & Meyer, 2001; Ayodeji Emmanuel Oke et al., 2019; A. E. Oke et al., 2018; Yogeshwaran et al., 2018). This may be due to a tendency to view Factors in operational rather than strategic terms – this is discussed further in section 8.2.11 below.

The largest opportunity was demand and recognition from the public sector. This may be reflective of the timing of the Follow-up survey, which was administered in March and April of 2020, at a time when NZ was at Covid-19 Alert Level 4 (full lockdown) and there was discussion around the role of public sector to invest in construction for economic stimulus. The largest threat was identified as QS firms that employ a cost leadership differentiation strategy. This is supported by the literature which highlights intensifying competition amongst QS firms was a key theme impacting on firms' success (N. Z. Abidin et al., 2014; Adesi et al., 2019; Ofori & Toor, 2012).

These findings are the result of the analysis of two rounds of descriptive survey. The findings discussed above are from the more recent round which analysed the responses of 137 respondents.

8.2.3.2 Conclusion

Overall, the External Factor impacts were found to range from 'small to medium opportunities' through to 'small to medium threats'. The Internal Factors were found to range between 'extremely important' to 'moderately important'.

These findings build on the developed situation analysis framework by providing time-poor managers with a starting point for ranking or weighting the application of these factors in their own firms.

The main limitation of the descriptive survey results is the generalisability of the findings outside of the population sample. The demographic characteristics of the sample are reported in order to inform this.

These findings fill a gap in the literature by providing an empirically weighted interpretation of the Factors acting on ANZ QS firms.

8.2.4 Change in Factor Weighting Over Time

8.2.4.1 Discussion

Objective 2(c) was to establish whether perceptions of Internal Factor importance and External Factor impact change over time. This objective was framed to provide some context to the findings, in terms of their validity over time.

Overall, the ranking of every Factor changed, though not all changes were statistically significant. Regarding the External Factors, there were numerous changes between the two rounds of data gathering. Six of the Factors' likely impact scores increased or decreased over 20%, 16 changed between 5% and 20% and only six Factors' scores changed less than 5%. The greatest change was 'upstream information' which increased by 45%. 'IT advances,' 'contractor demand' and 'public sector' rose by 21%, 22% and 28% respectively. Half of all Factors changed in rank by 5 positions or more. The most significant movement was 'upstream information' which moved 19 positions followed by 'contractor demand' and 'associated professionals' which gained 14 and 11 places respectively. It should be noted however, that the wording of the 'upstream information' Factor was amended between the two rounds of survey to reflect peer-reviewer feedback. It needs to be acknowledged, that some – or conceivably even all – of the change was due to the revised wording. One Factor, 'non-

construction professions,' moved from 'slight impact' to 'moderate impact,' though its overall rank remained unchanged.

For Internal Factors, the main changes between the two rounds of data gathering were to the 'leadership' and 'firm flexibility' Factors. The importance of 'leadership' increased by 14%, climbing from 21st to 4th place. Again, it must be acknowledged that the 'leadership' Factor was reworded (see section 4.4.1.1) between 2013 and 2020 in response to the peer reviewers' feedback. On the other hand, 'firm flexibility' decreased in importance by 9%, falling from 14th to 22nd place. Changes to the remaining Factors' importance scores are negligible (not statistically significant to the pre-defined alpha level of 0.05), constituting a change in rank of five positions or less.

Accounting for the Factors with altered wording, only six of the 54 variables experienced a significant change in rank. It is well acknowledged in the literature that businesses are operating in an environment of constant turbulent change that they must respond to (Day & Schoemaker, 2016; Jacobides, 2010; McPherson, 2016; Reeves & Deimler, 2011; Ricciardi, Zardini, & Rossignoli, 2016). It was therefore anticipated that changes would be more pronounced. However, as a mature profession in a mature market, in an industry that is known for being slow to adapt and innovate, it is possible that the situation for QS firms is less dynamic than for other businesses.

8.2.4.2 Conclusion

The views of the 106 respondents of the Original observation survey in 2013 were compared with the views of the 137 respondents to the Follow-up survey in 2020. The results of the Mann-Whitney U test for the difference between the perceived 'impact' and 'importance' means of the two groups are presented in Table 67 and Table 69 of section 5.4. The results show a statistically significant U-value exists (to a predefined alpha level 0.05) for 8 of 54 variables. On this basis, the null hypothesis was

rejected, and the alternative hypothesis supported which leads to the expected conclusion that perceptions of Internal Factor importance and External Factor impact do change over time.

This conclusion is important because it highlights the need for periodic refreshing of a situation analysis, and indeed strategic planning generally as the impact of both the Factors in the external environment, as well as the importance of the Internal Factors within the firm's control do not remain static.

The limitations noted in the previous section (8.2.3) also apply to these findings. These finding provide further context (the impact of time) and therefore further understanding of the empirically quantified Factor weightings.

8.2.5 The Influence of Culture on Factor Weighting

8.2.5.1 Discussion

Objective 2(d) was to establish whether perceptions of Internal factor importance and External Factor impact are culturally specific. This objective was framed to provide further context to the quantified weightings, in terms of their validity across different cultural contexts.

The Original observation data was stratified into groups of NZIQS and non-NZIQS respondents. Overall, there was a variance in the ranking of most Factors, the full results are presented in Table 33 and Table 38 respectively. Two External Factors of statistically significant disagreement were identified – other industries (NZIQS rank = 2, Non-NZIQS rank = 8) and public cost data (NZIQS rank = 24, Non-NZIQS rank = 14). Five Internal Factors of disagreement were identified – leadership (NZIQS rank = 15, Non-NZIQS rank = 24), rigour (NZIQS rank = 1, Non-NZIQS rank = 3), ethical

conduct (NZIQS rank = 2, Non-NZIQS rank = 3), client quality (NZIQS rank = 22, Non-NZIQS rank = 8), and measurement ability (NZIQS rank = 5, Non-NZIQS rank = 13).

This variance is not unsurprising. Both groups had broadly similar splits of ‘consultant QS’ and ‘other’ practitioners (NZIQS = 54%/40%, non-NZIQS = 35%/40%, refer Table 29) and ‘senior’ and ‘emerging’ respondents (NZIQS = 58%/35%, non-NZIQS = 47%/28%, refer also Table 29). However, the NZIQS group were far more likely to be practicing in ANZ (ANZ = 85.4%, other = 6.3%, unknown = 8.3%), so it is reasonably likely that geo-political factors have had a strong influence on situation analysis weightings.

These findings align with the literature. The influences of political borders, languages and culture on values, perceptions and decision making has been extensively documented and there are numerous articles that outline strategies to manage these differences (Meyer, 2015; Neeley, 2017; Yo-Jud Cheng & Groysberg, 2020).

8.2.5.2 Conclusion

The responses of the 106 respondents to the Original observation survey were stratified into NZIQS and non-NZIQS members as described in section 5.2.5.2 and 5.2.7.2. The results of the Mann-Whitney U test for the difference between the perceived ‘impact’ and ‘importance’ means of the two groups are presented in Table 33 and Table 38 of section 5.2. The results show a statistically significant U-value exists for 7 of 54 variables. On this basis, the null hypothesis was rejected, and the alternative hypothesis supported which leads to the expected conclusion that perceptions of Internal Factor importance and External Factor impact are culturally specific.

This conclusion is important because it highlights that while there is general agreement, there are likely to be culturally specific nuances. As a result, practitioners may choose to consider the views of QS stakeholders in other geo-political contexts to achieve a bigger picture view of global trends.

The limitations noted in section 8.2.3 also apply to these findings. These findings provide further context (the impact of culture / geo-political context) and therefore further understanding of the empirically quantified Factor weightings.

8.2.6 The Influence of Stakeholder Perspective on Factor Weighting

8.2.6.1 Discussion

Objective 2(e) was to establish whether perceptions of Internal factor importance and External Factor impact vary between internal and external stakeholders. The purpose of this objective was to provide additional context to the quantified weightings, in terms of whether the perspectives of those inside firms was different to those with an external perspective.

The Original observation data was stratified into groups of ‘consultant QS’s’ and ‘non consultant QS’s’. Overall, there was a variance in the ranking of most Factors, the full results are presented in Table 34 and Table 39 respectively. Two External Factors of statistically significant disagreement were identified – industry cycles (emerging rank = 22, experienced rank = 26) and profession lifecycle (emerging rank = 14, experienced rank = 20). Six Internal Factors of disagreement were identified – firm flexibility (emerging rank = 7, experienced rank = 19), interpersonal skill (emerging rank = 6, experienced rank = 13), communication skill (emerging rank = 2, experienced rank = 5), knowledge management (emerging rank = 9, experienced rank = 20), cost control ability (emerging rank = 1, experienced rank = 5), and cost knowledge (emerging rank = 5, experienced rank = 11).

What these findings indicate is that there is a disconnect between the perceptions of those inside the profession and those with insights, but outside of the profession. The tendency for a group of people to agree at the cost of reasoned decision making is known as ‘groupthink’ (Janis, 1972), for this reason, practitioners are encouraged to network outside of their industry or profession (D. Clark, 2016) to ensure diverse and rounded thinking and decision making can prevail. What these findings don’t reveal is whether the perceptions of one group are more valid than the other.

8.2.6.2 Conclusion

The responses of the 106 respondents to the Original observation survey were stratified into ‘consultant QS’s’ and ‘non consultant QS’s’ as described in section 5.2.5.4 and 5.2.7.4. The results of the Mann-Whitney U test for the difference between the perceived ‘impact’ and ‘importance’ means of the two groups are presented in Table 35 and Table 40 of section 5.2. The results show a statistically significant U-value exists for 4 of 54 variables. On this basis, the null hypothesis was rejected, and the alternative hypothesis supported which leads to the expected conclusion that perspectives on Internal Factor importance and External Factor impact are different for ‘consultant QS’s’ (insiders of the profession) than for ‘non-consultant QS’s’ (stakeholders of the profession).

This conclusion is important because it highlights that while there is general agreement, a person’s position inside or outside of a QS firm does appear to have an influence on perception. As a result, practitioners should pause to consider the views of external stakeholders in their strategic planning exercise in order to achieve a more comprehensive situation analysis.

The limitations noted in section 8.2.3 also apply to these findings. As per the previous set of findings, these findings provide further context (that the perspectives of those inside the firm are different to

those on the outside) and therefore further understanding of the empirically quantified Factor weightings.

8.2.7 The Influence of Responsibility for Strategy on Factor Weighting

8.2.7.1 Discussion

Objective 2(f) was to establish whether perceptions of Internal factor importance and External Factor impact vary between those responsible for creating strategy and those tasked with carrying it out. The purpose of this objective was to provide additional context to the quantified weightings, by understanding whether the perspectives of those tasked with strategic planning (senior managers) were consistent with other firm stakeholders.

Whilst it was not possible to stratify the data to separate out the strategy makers, the review of the literature made clear that strategic planning in QS firms was the domain of senior managers (Murphy, 2012). Whilst years' of experience is by no means the only characteristic of a senior manager, it is one readily available characteristic that could be investigated. As such, the Original observation data was stratified into groups of 'emerging' and 'senior' professionals.

Overall, there was a variance in the ranking of most Factors, the full results are presented in Table 35 and Table 40 respectively. Only one External Factor of statistically significant disagreement was identified – employment market (consulting QS rank = 21, others rank = 4). Three Internal Factors of disagreement were identified – networks (consulting QS rank = 20, others rank = 2), innovation capture (consulting QS rank = 25, others rank = 8), and construction knowledge (consulting QS rank = 16, others rank = 4).

The literature abounds with observations regarding the differences of values and perceptions of the various generations currently engaged in the workforce (Erickson, Alsop, Nicholson, & Miller, 2009; King, Finkelstein, Thomas, & Corrington, 2019). However, the validity and value of these difference perspectives in decision making is divided, some question whether younger generations' – millennials – lack of experience may be a severe limitation to their strategic leadership value (Bunker, Kram, & Ting, 2002; Shree & Srivastava, 2019) while others argue that their unique perspective positions them as drivers of profitability and even a source of competitive advantage (Dorsey, 2010; Zupan, Mihelič, & Aleksić, 2018).

8.2.7.2 Conclusion

The responses of the 106 respondents to the Original observation survey were stratified into 'senior' and 'emerging' as described in section 5.2.5.3 and 5.2.7.3. The results of the Mann-Whitney U test for the difference between the perceived 'impact' and 'importance' means of the two groups are presented in Table 35 and Table 40 of section 5.2. The results show a statistically significant U-value exists for 4 of 54 variables. On this basis, the null hypothesis was rejected, and the alternative hypothesis supported which leads to the expected conclusion that perspectives on Internal Factor importance and External Factor impact are different for 'consultant QS's' (insiders of the profession) than for 'non-consultant QS's' (stakeholders of the profession).

This conclusion is important because it highlights the risk that, as there can be a disconnect in the perspectives between emerging and senior professionals, the perspectives of those tasked with formulating strategy may not be representative of those responsible for operation delivery (the more emerging professionals). It will be for the strategy planners to determine whether this disconnect is

significant, whether there is a risk of group think or lack of perspective. A solution may be to invite consultation with emerging team members as part of the strategic planning process.

The limitations noted in section 8.2.3 also apply to these findings. Much like the previous two findings, these provide further context (there is a variance between the perspectives of strategy planners and those tasked with operational delivery) and therefore further understanding of the empirically quantified Factor weightings.

8.2.8 The Relationship Between External Factor Impact and Internal Factor Importance (Matching Multiplier)

8.2.8.1 Discussion

Objective 2(g) was to quantify the extent to which Internal Factors can be matched with External Factors (External Factor / Internal Factor relationship) to leverage strengths and mitigate threats and identify opportunities that may be missed or weaknesses that could be undermined. Quantification of these matches is required for the development of the Strategic Health model.

The results showed a statistically significant Spearman's rho value exists for 129 of 728 possible pairs of variables. The strongest correlations were considered 'low positive' or 'moderate'. The strongest relationship was found to exist between the External Factor of 'qualifications' (the style and quality of QS qualifications offered by tertiary education institutions) and the Internal Factor of 'training' (training and upskilling initiatives) – indicating that any deficiencies in formal training might be mitigated with good internal training. Further logical relationships with 'qualifications' in the top 20 list included 'networks' (extensive industry-wide networks, across clients, suppliers and partners/peers) and 'innovation capture' (channels for capturing innovation and creativity). Leading relationships were identified between the External Factor of 'IT substitutions' and the Internal Factors of 'work methods'

and ‘innovation capture’. The logic between most pairings is immediately clear – the 20 pairings with the strongest relationships are presented in Table 44 - although, some are less obvious. The concept of matching of Internal and External Factors to achieve leverage or mitigation is well established in the SWOT literature (Friend & Zehle, 2009; Porth, 2003; Sarsby, 2016; Wehrich, 1982). However, as noted in the Literature Review Chapter, there have been no previous attempts made to empirically determine matching potential between Internal and External Factors relevant to QS firms. As such these findings are novel.

8.2.8.2 Conclusion

The responses of the 106 respondents to the Original observation survey were analysed to determine whether there was a relationship between respondents’ rating of External Factor impact and Internal Factor importance. As there are 28 Forces and 26 Attributes, 728 Force-Attribute combinations were tested using Spearman’s Rank Correlation Coefficient to a predefined alpha level of 0.05. The results showed a statistically significant Spearman’s rho value exists for 129 of 728 possible pairs of variables. On this basis the null hypothesis was rejected, the alternative hypothesis supported, and the conclusion made that there is a positive (or negative) relationship between changes in the relative impact of External Forces and the relative importance rating of Internal Forces.

These findings are important in that they provide empirically determined matching percentages between combinations of External and Internal Factors which is central to the development of the Strategic Health mode.

A key limitation to acknowledge is that the presence of a relationship does not prove causality. However, in line with the Design School approach to strategic planning, this study assumes that the External Factors influence the Internal response. There is no credible body of knowledge to suggest

the inverse is true. Whilst the concept of matching internal and external factors is well established in SWOT analysis literature, there is no published evidence of any empirical quantification of these matching percentages for the Factors relevant to QS firms.

8.2.9 Changes in Matching Percentage Over Time

8.2.9.1 Discussion

Objective 2(h) was to establish whether the strength of External and Internal Factor relationships change over time. The purpose of this objective was to understand whether the matching percentages remain constant or a dynamic in response to the ratings of the underlying External and Internal Factors.

Table 72 in section 5.4, compares the change and correlation coefficients (in terms of total correlation scores and rank) of the internal factors between the Original and Follow-up observations. Every factor changed rank somewhat between the two stages. Notably, training and upskilling initiatives and channels for capturing innovation and creativity both remained very high for both stages. Internal factors that gained relatively higher levels of correlation between the two stages included leadership and people management. Leadership rose from 24th to 7th place, and people management 23rd to 4th. On the other hand, legal knowledge fell from 1st to 20th place, and networks and cost control ability both fell 18 places. This aspect of the study explores novel ground. To the knowledge of the researcher, no other studies have tested the matching of Internal and External Factors in the manner undertaken in this study, nor explored the changes thereto over time.

8.2.9.2 Conclusion

The two independent points in time of the original and follow-up observations are the independent variables, the dependent variable is the rank order of the Force-Attribute relationships attributable to each Internal Factor. The presence of perfectly rank-matched pairs between the data sets of both observations would indicate a level of consistency in the matching percentages.

The results of the correlation ranks are presented in Table 72 of section 5.4. The results show the ranking of all 26 Internal Factors changed between the two observations. Therefore, the null hypothesis is rejected, the alternative hypothesis supported, and the conclusion made that the strength of External and Internal Factor relationships do change over time.

This finding underlines the importance of periodic re-evaluation not only of the underlying Factors, but also the matching percentages used in the development of the Model 2, as these do not appear to remain constant over time. A limitation here may be the relatively small number of observations in both surveys (between 106 and 137), and the large number (728) of relationships that were tested. Reducing the number of relationships and increasing the number of observations will enable this finding to be tested with greater confidence.

These observations further fill the extant knowledge gaps by providing addition context and limitations to the application of the developed model; and, suggest that Internal External Factor matching relationships do change over time.

8.2.10 The Developed Strategic Health Model

8.2.10.1 Discussion

Objectives 3(a) and 3(b) were; to develop a quantitative model based on the ‘perceived importance-based’ weightings of controllable Internal Factors to predict success and allow firms to identify which Internal Attributes to prioritise for performance effort, and; to develop a second quantitative model based on the ‘External Force-matched’ weightings of controllable Internal Factors to predict success and allow firms to identify which Internal Attributes to prioritise for performance effort. The purpose of these two objectives was to develop models that could be tested in future stages of the study.

The two developed models are presented in sections 6.2 and 6.3. The first, based on the RBV approach, relies on the importance ratings of Internal Factors. The second, grounded in the Design School approach to strategic planning, is based on the matching percentages derived from the correlation analysis between each pairing of Internal and External Factors.

8.2.10.2 Conclusion

In conclusion, the study has quantitative developed models to reflect both an RBV and Design School approach to strategic planning. The validity of both models is discussed in the remaining sections of this chapter. The developed models are based on the Factors identified and quantified in this study.

The development of these models was crucial for the remaining research objectives that test the models’ validity.

This stage of the study fills a significant gap in extant knowledge through the development, particularly of Model 2, which offers a quantitative Situation Analysis tool prepopulated with factors and weightings relevant to QS firms.

8.2.11 Stated Importance vs Modelled Strategic Importance

8.2.11.1 Discussion

Objective 3(c) was to determine whether the ranking in Internal Factors in the ‘perceived importance-based’ model matches the ranking in the ‘External Force-matched’ model. The purpose of this objective was to understand whether the ‘default’ importance placed on Internal Factors by practitioners took account of each Factor’s ability to maximise helpful, and minimise harmful, External Factors.

Table 77 in section 6.4 presents the Internal Factors ranked in terms of both their ‘default’ importance rating as well as their ‘strategic’ importance. All but one Factor (client quality) are ranked differently under each model. The three top ranked Factors under Model 2 (training, innovation capture and people management) are ranked 11th, 23rd and 20th under Model 1

There are two possible explanations apparent to the researcher for this disconnect. The first is heuristic bias, and the second is confusion between ‘operational’ and ‘strategic’ importance.

A possible explanation for this disconnect is heuristic bias – the tendency to take mental shortcuts when presented with a novel problem that demands concerted effort. In the case of this study, the novel problem encountered by respondents was to rate the importance of Internal Factors in terms of their ability to ensure successful outcomes with cognisance of the current (threat and opportunity) state of the external environment; i.e.: their ‘strategic’ importance. The substituted heuristic question may have been ‘does this factor seem important or good or valued by QS firms?’

This phenomenon is described by Daniel Kahneman (2011; Suedfeld & Tetlock, 2019) as ‘fast’ and ‘slow’ thinking occurring in the brain’s systems 1 and 2 respectively. ‘Fast’ thinking is just that – fast

– and intuitive; informed by previous experiences and learnings. It is quick and efficient but prone to bias, which is where the ‘slow’ thinking of system 2 comes in. ‘Slow’ thinking is the deliberate focussed reasoning applied to novel problems where ‘fast’ thinking falters. Unfortunately, due to the effort involved, there is a tendency to substitute ‘slow’ thinking with the more efficient processes of system 1.

The presence of ‘fast’ thinking heuristic biases in strategic decision making is documented in the literature through numerous studies (Azar, 2014; Busenitz & Barney, 1997; Suedfeld & Tetlock, 2019), with the potential to lead to disastrous outcomes – even in well-established and highly successful organisations (Maule & Hodgkinson, 2002; Richie & Josephson, 2018; Toplak, West, & Stanovich, 2017).

This ‘fast’ thinking tendency would explain why Internal Factors with little modelled strategic importance were given relatively high base ‘importance’ scores. For instance, ‘ethical conduct’ was ranked 3rd and 1st in terms of importance ratings in the Original and Follow-up observations; but was only ranked 20th in terms of strategic importance (under the External Force-Matched model). It is conceivable that a ‘fast’ thinking response to the heuristic question: ‘how important or valuable is ethical conduct?’ returns the answer: ‘very important’, even though it is difficult to see how ‘ethical conduct’ could provide much mitigation to threats or leverage to opportunities. The heuristic response could be thought of as ‘operational’ importance (assists with day to day functioning) rather than ‘strategic’ importance (assist with achievement of strategic goals).

8.2.11.2 Conclusion

The responses of the 137 respondents to the Follow-up observation survey were analysed to determine whether the ranking of Internal Factors in the ‘perceived importance-based’ model matches the

ranking in the 'External Force-matched' model. The presence of perfectly matched pairs between both sets of data was selected to test the hypothesis.

The results of the importance ranks according to Model 1 and 2 are presented in Table 77 of section 6.4. The results show a variance in the ranking of all but one of the 26 Internal Factors between the two models. On this basis the null hypothesis was rejected, the alternative hypothesis supported, and the conclusion made that the ranking of Internal Factors in the 'perceived importance-based' model (default / operational importance) does not match the ranking in the 'External Force-matched' model (strategic importance).

These findings suggest that Internal Factors would not normally be prioritised in accordance with their ability to leverage External Factors. This underlines the importance of structured frameworks to guide Situation Analysis exercises and resultant strategic planning.

8.2.12 Performance vs Stated Importance

8.2.12.1 Discussion

Objective 3(d) was to establish whether QS firms' relative levels of performance of Internal Factors matches the order of importance of those Factors based on the 'perceived importance-based' model. The purpose of this objective was to establish whether performance gaps – and therefore pathways to improvement could be identified.

Table 74 presented the results of the Original Observation data applied to Model 1. Model 1 regards ethical conduct, rigour and estimating ability as the most valuable Internal Factors. The most valuable Internal Factor (ethical conduct = 0.91) is 'worth' 1.57 times the amount of the least valuable (international reach = 0.58). In the Follow-up Observation, typical firms achieve a 67% health rating;

the largest contributions to health are from rigour (4.83%), ethical conduct (4.82%), and estimating ability (4.71%). The smallest contributions to firm health come from international reach (2.34%), and brand (2.6%).

The most urgent improvement areas (based on the gap between value and performance) are training, innovation capture, and leadership. Training and Innovation capture were both factors that the literature identified as important focus areas (refer sections 2.6.3 and 2.6.7 of the Literature Review).

8.2.12.2 Conclusion

The responses of the 106 respondents to the Original observation survey were analysed to determine whether QS firms' relative levels of performance of Internal Factors matches the order of importance (value) of those Factors based on the 'perceived importance-based' model (Model 1). The performance of Internal Factors by QS firms, as rated by the respondents to the Original observation survey, were compared with the Importance ratings of those Internal Factors as rated by those same respondents and represented in Model 1. Perfectly matched pairs between both sets of ranked data was selected to be the test for the hypothesis.

The rank order results of Internal Factors' value and performance based on the Original Observation data under Model 1 were presented in Table 74. The results show 26 of 26 pairs are discordant (ranks do not match).

On this basis the null hypothesis was rejected, the alternative hypothesis is supported, and the conclusion made that QS firms' relative levels of performance of Internal Factors does not match the order of importance (value) of those Factors based on the 'perceived importance-based' model (Model 1).

These findings are important because they point towards the typical gaps between the stated importance of the Internal Factors and actual performance of them, as applicable to typical QS firms. The small overall sample size, and the diversity of that sample should be noted when attempting to generalise these findings. It should also be noted that Model 2 was found to be more effective so would provide a more valid gap analysis and improvement pathway (refer section 8.2.14 below).

8.2.13 Performance vs Modelled Strategic Importance

8.2.13.1 Discussion

Objective 3(e) is to establish whether QS firms' relative levels of performance of Internal Factors matches the order of importance of those Factors based on the 'External Force-matched' model. As for the previous objective, the purpose of this objective was to establish whether performance gaps – and therefore pathways to improvement could be identified based on this model.

Table 76 presented the results of the Original Observation data applied to Model 2. The Strategic Health model computes training, people management, and innovation capture as the three most valuable Internal Factors. The most valuable Internal Factor (training = 1.72) is 'worth' 19.1 times the amount of the least valuable (rigour = 0.09).

In the Follow-up Observation, typical firms achieve a 65% health rating; the largest contributions to health are from training (11.45%), people management (8.67%), and innovation capture (8.38%). The smallest contributions to firm health come from rigour (0.60%), and teamwork (0.86%).

The most urgent improvement areas (based on the gap between value and performance) are training, innovation capture, and people management. QS's are regularly criticised for their lack of innovation (Adegbembo & Moyanga, 2019; Hardie et al., 2005; Smith, 2004) so this finding is consistent with the

literature. Upskilling and training has also been identified as a key challenge for QS's (O'Brien et al., 2014).

8.2.13.2 Conclusion

The responses of the 106 respondents to the Original observation survey were analysed to determine whether QS firms' relative levels of performance of Internal Factors matches the order of importance (value) of those Factors based on the 'External Force-matched' model (Model 2). The performance of Internal Factors by QS firms, as rated by the respondents to the Original observation survey, was compared with the Importance ratings of those Internal Factors as determined by Model 2.

Perfectly matched pairs between both sets of ranked data was selected to be the test for the hypothesis.

The rank order results of Internal Factors' value and performance based on the Original Observation data under Model 2 were presented in Table 76. The results show 26 of 26 pairs are discordant (ranks do not match).

On this basis the null hypothesis was rejected, the alternative hypothesis is supported, and the conclusion made that QS firms' relative levels of performance of Internal Factors does not match the order of importance (value) of those Factors based on the 'External Force-matched' model (Model 2).

As for the previous conclusion, these findings are important because they point towards the typical gaps between the performance Internal Factors compared to their importance in terms of their matching percentage. This gap represents the area that QS firms typically would need to focus improvement on in order to achieve a higher Strategic Health score. Again, the small overall sample size, and the diversity of that sample should be noted when attempting to generalise these findings.

8.2.14 Relationship Between Performance and Success

8.2.14.1 Discussion

Objective 4(c) was to establish which of the two models provides the more accurate prediction of success. This firstly required the measurement of relative levels of success and performance – in terms of the developed models – of real-life QS firms (Objective 4(a)), and; establishing whether there is a positive correlation between their relative levels of modelled health and success (Objective 4(b)).

Five out of the ten measures of success were found to correlate with performance in terms of Model 1; these are positive client feedback, the ability to attract a relatively high fee, efficient operations, workload growth, and growth of client base. The highest success measure correlation with performance was operations (1.000 – perfectly correlated), followed by workload growth and client feedback (0.900), client base growth (0.872, and lastly, fees (0.821). The success measures of repeat business, employee satisfaction, employee retention, employee number growth, and overall success were not found to correlate with the performance results of Model 1.

As for Model 2, the same five of the ten measures of success were found to correlate with performance in terms of Model 2. The highest success measure correlation with performance again was operations (1.000 – perfectly correlated), followed by workload growth and client feedback (0.900), client base growth (0.872, and lastly, fees (0.821). Also, as for Model 1, the success measures of repeat business, employee satisfaction, employee retention, employee number growth, and overall success were not found to correlate with the performance results of Model 2.

The results show that correlations exist for five of the ten variables for both models. Closer inspection reveals that those five correlations are achieved in Model 2 by consideration of the top ten variables,

whereas in Model 1, the same level of correlation is only achieved after the introduction of the 11th variable into the model.

8.2.14.2 Conclusion

As noted in the discussion, Model 2 exhibits a more sensitive (stronger) relationship to the tested success measures than Model 1. On this basis the null hypothesis was rejected, the alternative hypothesis is supported, and the conclusion made that there is a closer relationship between the 'External Force-matched' model (*H2*) level of 'strategic health' and success than between the 'perceived importance-based' model (*H1*) level of 'health' and success.

This conclusion provides the overall capstone to the research questions by identifying the model that best captures the Strategic Health of QS firms and the pathways to improvement. This finding confirms that Matching Percentage ranking of Internal Factors provides the better predictor of Strategic Health and therefore better method for prioritising improvements to Internal Factors.

8.3 Answering of the Research Questions

8.3.1 Question 1

What are the most important Factors that should be considered in strategic planning for QS firms to ensure success?

The study identified 28 External Factors and 26 Internal Factors for consideration in a Situation Analysis. The External Factors were rated and ranked according to their level of impact on QS firms' success. The five most impactful External Factors were found to be public sector demand, IT advances, IT substitutions, price competition and, upstream information. Public sector demand and

IT advances are the top two Opportunities, whereas price competition and lead consultants are considered the top Threats. The 26 Internal Factors are ranked according to their total level of correlation with the External Factors (matching percentage). The five Internal Factors with the highest matching percentage are training, innovation capture, strategic management, people management, and (efficient and effective) work methods.

8.3.2 Question 2

How should QS firms prioritise improvement effort between the key Factors under their control (Internal Factors)?

Firms should prioritise improvement efforts on those Internal Factors that hold the highest strategic value. The five Internal Factors with the highest strategic value are training, people management, innovation capture, strategic management and (efficient and effective) work methods. Firms should prioritise improvements efforts towards the Internal Factors with the biggest gaps between order of performance and match-ability.

8.3.3 Question 3

Is there a relationship between the performance of the key Internal Factors and successful business outcomes?

The research found that yes, there is a relationship between the performance of the key Internal Factors and successful business outcomes. Firms that report higher performance in terms of the Internal Factors, also report higher results in terms of successful outcomes. Specifically, higher

performance of Internal Attributes was found to correlate with good client feedback; profitability (evidenced by good revenue and operational efficiency); workload growth, and; client-base growth.

8.4 Limitations

8.4.1 Researcher's Bias

The researcher's position as a practicing QS is a potential source of bias. As pointed out by R. Clarke and Davison (2020), the researcher's perspective can lead to the prioritising of their stake holding interests. This bias is limited through the range of the researcher's employment positions spanning client organisations, main contractors as well as QS firms; meaning the researcher has a wide perspective of the QS profession not limited to consulting firms.

8.4.2 Sampling Limitations (Sample Size and Self-Selection)

As pointed out by Saunders et al. (2016), any limitations on the representativeness of the study samples can restrict the generalisability of the generated finding. There are a number of sampling limitations to be highlighted.

8.4.2.1 Exploratory Limitations and Mitigations

Firstly, convenience and snowball sampling were employed for the selection of the exploratory stage interviewees. Bias was limited by selecting interviewees from a range of medium to large sized firms, in Australia and New Zealand, and speaking to firm directors as well as professional institute directors and academics.

8.4.2.2 Self-Selection and Low Sample Size Limitations

Due to the anticipated low rates of response (see section 1.7 above) a census sampling approach was applied to the descriptive questionnaire stage. The presence of non-responses means positive responses are essentially self-selected. The use of self-selection in the census survey is a source of potential bias and limitations of the descriptive survey stages. However, as noted by Keating (1989), Fricker (2008) and Sharma (2017), self-selection in sampling should not immediately cause concerns of bias or undermine confidence in results of what is otherwise well designed research. It could be argued that self-selection dictates that only respondents that have an interest in providing considered answers take part. Noting also that the subject matter of the study is not of a sensitive nature, and does not require respondents to make judgements of, or comparisons to other professions, the likelihood of individual respondents having particularly biased views is reduced.

However, the main limitation encountered in this study is the low response rate to the web questionnaire. Low response rates are a known challenge in construction research and specifically in the ANZ QS field (as advised by the NZIQS). This is further compounded by the requirement for relatively higher response rates for small populations (Saunders et al., 2016) requiring a reasonable confidence level and margin of error. The effective response rates received were under 1% for the AIQS, and between 3% and 8.68% for the NZIQS. The NZIQS response rate is in line with expectations for this population (advice from the NZIQS was that response rates greater than 5% were unlikely). The AIQS response rate is lower than expected and may be to do with a perceived lack of benefit of participating in research undertaken by a non-Australian institution. This limits the extent the results should be generalized outside of the study population and also limited the amount of analysis that could be undertaken within any sub-strata of the data (Saunders et al., 2016).

8.4.2.3 *Bias and Validity Risk Mitigating Measures*

A number of strategies were applied to address and mitigate the risk of bias and validity limitations:

- The multi-stage mixed-methods approach was selected. The exploratory stage provided in-depth understanding of the Factors to be tested. The case-studies helped to validate the findings generated in the descriptive stage.
- Methodological triangulation (as recommended by Saunders et al. (2016) to improve validity) was achieved through the multi-stage mixed methods research design using secondary literature sources, qualitative in depth semi structured interviews, quantitative descriptive surveys undertaken in two stages (repeated), and finally, evaluative case study surveys.
- Where possible, measurement validity was achieved through checking of data with respondents (interview transcript sign-off), discussing questionnaire design with supervision team, and pre-testing the questionnaires with industry. These steps allowed research stakeholders to correct and validate the measurement instruments.
- Clear documentation of approaches to the various stages of the study was the main step taken to uphold the reliability of the data gathered. All key correspondence with participants was through written means to allow future or third-party interrogation of assumptions and key messages. Repetition of the original observation survey with a follow up observation seven years later goes some way to demonstrating the repeatability of the core quantitative stage of the study.
- Cronbach's Alpha coefficient was used to measure the consistency of responses across a number of questions and determined that they were in fact measuring the same underlying variable.

- Pre-testing of the questionnaire, use of intuitive proprietary web-based survey tools, distribution through reputable industry professional institutes, and the offering of incentives were among the techniques used to maximise response rates.

Nevertheless, despite the above measures, care should be taken when attempting to generalise the findings outside of the sample population.

8.4.3 Measurement Limitations

Limitations can apply to the proxies selected to measure the variables of interest (Saunders et al., 2016). This particularly applies to the success measures used in the case studies – self-reported perception data was relied upon as obtaining audited financial data to analyse firm performance was not possible. The truthfulness of respondents is also a limitation (Malheiros et al., 2013; Saunders et al., 2016). This was considered most likely to be concern for the case study stage (where data from real life firms was sought). The distribution of the questionnaire to all QS staff (not just directors) was a step taken to minimise any tendencies to present the firm to researchers in the best light.

8.4.4 Statistical Analysis Limitations

The data gathered was found not to follow a normal distribution which meant parametric statistical techniques could not be applied. Suitable non-parametric techniques were selected. As discussed in the Research Methods chapter, the main inferential statistic applied was correlation analysis. As regression analysis was not suitable due to the data characteristics, the statistical findings were limited to establishing relationships between variables as opposed to establishing how the independent variables effect the dependent variables (Hinkle et al., 2003; Kolassa, 2020; Laerd Statistics, 2020;

Morgan, 2017). Existing theory is relied upon to help explain the independent-dependent variables relationship.

8.5 Implications of the Study

As indicated by the literature review, very little empirical research has been undertaken regarding the key Internal and External Factors impacting on the success of QS firms, particularly in ANZ. Furthermore, there is a distinct lack of strategic planning tools available for QS firms and business strategists generally. Finally, there is little in the way of quantitative frameworks available to firms to use for Situation Analysis, and none, that provide a method for firms to quantitatively match Internal and External Factors. This study has reduced those gaps with the following developments:

8.5.1 Framework of Situation Analysis Factors and Segregation into Internal and External

Following a review of the extant literature, the exploratory research phase yielded a structured list of 54 Factors and segregated these into Internal and External Factors. This is the first such empirically derived framework applicable to ANZ QS firms.

8.5.2 Impact Weighting of External Factors and Segregation in Threats and Opportunities

Following on from the development of the Framework, this study also evaluated the impact of each External Factor through descriptive survey. Weighting of External Factors also enabled segregation into Threat (harmful factor) or Opportunity (helpful factor).

8.5.3 Ranking of Internal Factors According to (Operational) Importance

Similarly, descriptive survey allowed the ranking of Internal Factors according to the importance ratings applied by respondents. This importance rated ranking of Internal Factors is referred to in the study as ‘operational’ importance.

8.5.4 Ranking of Internal Factors According to Match-ability (Strategic Importance)

Correlation analysis between the Impact rating of External Factors and the corresponding Importance rating of Internal Factors allowed the establishment of match-ability percentages between each combination of Internal and External Factors. This novel metric allowed the ranking of Internal Factors according to ‘strategic’ importance – that is, the extent to which they can be utilised to leverage Opportunities or mitigate Threats.

8.5.5 Different Perspectives

Stratification and comparison of the results by key demographic measures provided insight into the different perspectives that exist regarding the impact and importance of Factors. Disagreement was found to exist between the following groups: NZIQS and non-NZIQS respondents; emerging and senior respondents, and; consulting QS and non-consulting QS respondents.

8.5.6 The Development and Testing of a Quantitative Situation Analysis Model Integrating External-Internal Factor Matching

The identification and subsequent weighting and ranking of Factors enabled the development and testing of a quantitative situation analysis model. This model is a novel contribution in itself, notable

is the matching mechanism that quantifies the extent to which Internal Factors can leverage Opportunities or mitigate Threats.

8.5.7 Application of the Model in Practice

8.5.7.1 Overview

The application of the model for QS firms is fairly straightforward. The model provides a mechanism for identifying pathways to improvement by analysing the gap between rankings of strategic importance versus actual performance – and actioning improvement of the largest gaps as a priority. It should be noted that the results achieved in this study are for ‘typical’ QS firms so should be taken as generally – rather than specifically – applicable to individual firm cases.

8.5.7.2 Step 1: Internal Factor Performance Review

The first step is an internal review and rating of current performance of the 26 Internal Factors (as set out in Table 14). Individual firms may elect to do this through questionnaires, by focus groups, or in workshop settings. Regardless of the method employed, the end result must enable the ranking of Internal Factors based on relative levels of current performance.

8.5.7.3 Step 2: Performance Gap Analysis

The next step is to simply compare the ranked performance of the Internal Factors with their strategic value rankings (see ‘Value’ column in Table 76) and calculate the performance gaps (with positive gaps representing a deficit in performance and negative gaps representing theoretical overperformance).

8.5.7.4 Step 3: Targeted Performance Improvement

Finally, the pathway to improvement is simply to target performance improvement of the largest gaps. Firms may elect to target the top handful of gaps rather than to address every deficit at once.

8.6 Recommendations for Stakeholders of QS Firms

8.6.1 Professional Institutes

A number of External Factors impacting on firms' success that were discovered in the study fall under the remit of professional institutes. These are: the quality of marketing and profile building initiatives by QS institutes; the quality of marketing and profile building initiatives by QS institutes, and; the barriers to entry for new competitors (such as professional registration, requisite knowledge, technology etc.). To the extent that professional institutes can control or influence these External Factors, it is recommended that effort is directed toward ensuring these factors are as helpful to QS firms as possible – rather than harmful. A starting point may be to ensure that institute provided CPD is aligned with the important operational and strategic Factors identified in this study.

8.6.2 Education Providers

The style and quality of QS qualifications offered by tertiary education institutions and the availability of suitably skilled, qualified and experienced practitioners were two External Factors that were identified as impacting on QS firm success that are of relevance to QS education providers. Tertiary education institutes play a key role in ensuring graduates are market ready. The ranking of Internal Factors, both by operation importance and match-ability (strategic importance) provides guidance to tertiary institutions on the attributes that are important for new entrants to the workforce. For

instance, the ability to learn and upskill on the job and generate and channel new innovations are the two most strategically important Internal Factors – much more important than measurement, estimating and cost management skills – that traditional areas of focus for QS qualifications.

8.6.3 Individual Practitioners

Similarly, the developed frameworks provide individual practitioners and job candidates with guidance to the operational and strategic importance of attributes. For example, while technical skills and competencies are operationally important, demonstrated ability to help organisations upskill and innovate are capabilities that would be seen to add strategic value in light of this study. Practitioners are recommended to take heed of the Internal Factors as focus areas for their own professional development.

8.6.4 Typical QS Firms

Typical QS firms operating in the ANZ region are recommended to take heed of the performance gaps identified both in terms strategic importance and consider whether these highlighted improvement requirements apply to their own situation. The five most strategically critical improvement areas identified were:

1. Channels for capturing innovation and creativity;
2. Active marketing and brand promotion;
3. Training and up-skilling initiatives;
4. International presence or connections (with clients, suppliers and partners/peers), and;
5. Strategic management – the formulation and implementation of strategic actions.

8.6.5 Strategy Decision Makers

Finally, those responsible for strategic planning in QS firms are encouraged to apply the developed Framework of External and Internal Factors to their own Situation Analysis exercises. In doing so, firms should review the checklist for any additional factors that may have arisen, particularly firms outside of Australia or New Zealand or firms operating substantially outside of the vertical commercial construction sector (the main context of this study). Strategists are encouraged to consider the ‘strategic’ importance of the Internal Factors under the firm’s control, that is, those that can be matched with External Factors to mitigate threats and maximise opportunities. Guidance could be taken from the match-ability results generated by the descriptive survey. Firms that do not have the time or resources to undertake full quantitative Situation Analysis exercises from first principles, may find benefit from focussing on the top handful of Internal Factors most recently found to be strategically important in this study. Priorities for improvement areas could be determined by identifying the largest gaps between ranks of importance and performance.

8.7 Recommendations for Further Research

Recommendations for future research centre on three key areas:

1. Improving generalisability: The two rounds of descriptive survey achieved relatively low response rates, together with the potential for bias due to self-selection, the extent to which the findings can be generalised outside of the sample population is limited. Future research that achieves more representative samples is recommended. A possible means for achieving this might be to select a larger population requiring a smaller sample population percentage.

Increasing the geographic scope or utilising a larger professional organisation as the primary sampling frame (such as the Royal Institution of Chartered Surveyors) are two ways that this might be achieved in future studies.

2. Improving usability: The developed framework consists of 28 External and 26 Internal Factors producing 728 possible combinations of relationships. Whilst the model provides avenues for ranking Factors and prioritising improvement actions, future stages of the research could be aimed at reducing both the number of Factors and matching relationships to be quantified.
3. Deepening understanding of perspectives: The research identified disparity of views between three main demographic stratifications. Attempts to identify the reasons behind the discordant views, as well as attempting to establish whether any of the competing views are more valid than the other – could help to improve the validity of strategic planning exercises by identifying any perspectives that should be given more weight.
4. Investigation of secondary issues: The study identified 54 Factors – many of which would benefit from further research themselves in the ANZ context. The barriers and enablers of the most strategically important Internal Factors (such as training and up-skilling initiatives and channels for capturing innovation and creativity) would be the recommended starting points for further research.
5. Application to other contexts: The developed model including the correlation-based approach quantifying the match-ability of Internal and External Factors are concepts that could be applied to other professions or industries. Associated professions (such as construction project managers) may even be able to adapt the QS Situation Analysis framework as a starting point.

8.8 Chapter Summary

This study has developed the first ever empirically determined framework of Factors critical to the success of QS firms. Furthermore, this study has derived the quantitative weightings applicable to each of those factors and identified the strength of relationship present between each pairing of Internal and External Factor. The findings provide ANZ QS firms with a toolkit for diagnosing their current levels of performance and methods for identifying and prioritising improvement areas.

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APPENDICES

Appendix A Semi Structured Interview Documents



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PARTICIPANT INFORMATION SHEET

Project Title: Diagnosing the strategic health of Australasian quantity surveying organisations: a SWOT-based analytical model.

Project Description: The quantity surveying profession is facing a multiplicity of challenges that threaten its existence. To remain relevant, competitive and successful in the long term, the profession must set comprehensive goals aimed at delivering superior value to stakeholders. However, to achieve the set goals, the profession must first ensure it is in good strategic health. This could be ascertained from the extent to which it is able to leverage its key strengths to exploit prime opportunities as well as minimise exposure of its critical weaknesses to militating threats. In the absence of a quantitative framework, which is a gap in the extant literature, this study aims to first develop the Strategic Health Index (SHI) as a conceptual tool for diagnosing the strategic health of an organisation based on its SWOT (strengths, weaknesses, opportunities and threats) analysis outcomes. The developed tool will then be applied to the Australasian quantity surveying profession to ascertain its strategic health condition and the key areas requiring corrective action.

Benefits of the Research: Results are expected to show the key strengths most leveraged to exploit identified opportunities, and the critical weaknesses exposing the profession to the major threats; both in actual and optimal terms. The overall strategic health of the profession could be ascertained based on its SHI scores. While the expected results will specifically relate to quantity surveyors, other business managers seeking to assess the long-term health and survival of their organisations would also benefit from the use of the developed model.

Invitation for Participation: To achieve the goal of this research, we are dependent on your voluntary participation in the research interviews and would like your feedback on the key issues highlighted in the research objectives. By participating, your valuable input will contribute to the growth and development of the construction cost management profession.



Research Strategy: The descriptive survey method is employed for this study. This involves sourcing and analysing qualitative data from published sources and pilot surveys, and later quantitative data from questionnaire surveys and case studies. The qualitative data will be used to design quantitative questionnaires, which will be administered to members of the Australian and New Zealand Institutes of Quantity Surveyors – the target population of the study.

Interview Procedure: This first phase of the research, in which you have been invited to participate, involves qualitative interviews to obtain feedback from participants on the constructs underlying the research objectives. The interview is envisaged to take between 30 and 60 minutes. The interview is semi-structured in the sense that you will be posed a series of key questions to guide the feedback provided. You can expect to be asked the following questions:

1. What are the internal critical success factors (CSFs) required for the profession to remain relevant, competitive and successful in the long term?
2. What are the strengths and weaknesses of the profession?
3. What are the main external threats to the profession, and which of the profession's weaknesses make it vulnerable to these?
4. What are the main external opportunities for the profession and which strengths could be used to leverage these?

Participant Identification: You have been contacted for participation in this study as you have been identified as a key leader within the New Zealand or Australian quantity surveying profession.

Participant's Rights: Please note that you are under no obligation to accept this research invitation. If you do decide to participate, you have the right to withdraw from the study at any time without the need for prior notification. Participants who indicate on the Consent Form their interest in receiving the research results will be provided with a summary of the key findings.

Interview recording and data management: To be able to accurately transcribe interview feedback, a voice recorder will be used during the interview. However, you have the right to object to the use of the recorder or ask for it to be turned off at any time. You will also be given the opportunity to edit and approve the transcription as true and accurate. Data gathered from the interviews will be anonymous and used solely for academic research purposes; it will be



treated with strict confidence and disposed of at the end of the research. Personal details identifying the participants will not be published.

Human Ethics: This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone +64 (0) 6 350 5249, e-mail humanethics@massey.ac.nz.

Project Contacts

If you have any questions about the project, you may contact the researchers directly:

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Yours faithfully,

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PARTICIPANT CONSENT FORM (PILOT SURVEY INTERVIEW)

Project Title: Diagnosing the strategic health of Australasian quantity surveying organisations: a SWOT-based analytical model.

I have read the research Participant Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time. I understand that this interview will be audio recorded for transcription purposes.

I would like to participate in this study under the conditions set out herein and on the attached Information Sheet

I would like the opportunity to read and amend the interview transcript and approve it as true and accurate (please circle 'yes' or 'no'): YES / NO

I would like to receive a summary of the key findings of this research (please circle 'yes' or 'no'): YES / NO

Signature: _____ **Date:** _____

Full Name:



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TRANSCRIPT RELEASE FORM (PILOT SURVEY INTERVIEW)

Project Title: *Diagnosing the strategic health of Australasian quantity surveying organisations: a SWOT-based analytical model.*

I confirm that I have had the opportunity to read and amend the transcript of the interview conducted with me. I hereby verify it as true and accurate (please select **one** of the following options)...

with no amendments:

OR

subject to the amendments made below:

| Transcript line # | Amendment |
|-------------------|--|
| | <p style="text-align: right;">Please attach additional pages if required</p> |

I agree that the edited transcript and extracts from this may be used in academic reports and publications arising from the research while keeping my responses anonymous.

Signature: **Date:**

Full Name:

Appendix B Descriptive Survey – Original Observation (2013) Documents



ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

INTRODUCTION

Thank you for choosing to participate in this survey.

The aim of this research is to develop the Strategic Health Index (SHI) as a tool to enable quantity surveying (QS) firms to diagnose their success potential and the steps required to improve it. This study draws on the views of members from the Australia, New Zealand and Singapore institutes of quantity surveyors as well as professionals and academics from various groups and networks around the world. The research findings will have relevance for QS practices worldwide.

This questionnaire covers the key strengths, weaknesses, opportunities and threats (SWOT) faced by QS firms. It should take you around 15 to 20 minutes to complete. At the end of the questionnaire you will be given the opportunity to request a summary of the key findings.

Participation is anonymous and voluntary. You do not have to participate in this survey. If you decide to participate, you have the right to:

- decline to answer any particular question;
- discontinue the questionnaire at any time;
- ask any questions about the study at any time;
- provide information on the understanding that your name will not be connected with your answers in any way;
- access a summary of the project findings when it is concluded (findings will also be published in academic journals).

Should you have any questions about this study, please do not hesitate to contact any of the research team members below.

Many thanks.

Marcel Frei: m.frei@massey.ac.nz

Dr Jasper Mbachu: j.i.mbachu@massey.ac.nz

Associate Professor Robyn Phipps: r.a.phipps@massey.ac.nz



Massey University



ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

PROFESSIONAL AFFILIATION

1. To enter the questionnaire, please indicate which of the following professional institutes and networks you are a member of:

- None
- NZIQS (New Zealand Institute of Quantity Surveyors)
- AIQS (Australian Institute of Quantity Surveyors)
- SISV (Singapore Institute of Surveyors and Valuers)
- RICS (Royal Institute of Chartered Surveyors)
- CNBR (Cooperative Network for Building Researchers)
- other (please specify)



ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

THE 'TYPICAL' QS FIRM

This questionnaire asks you to rate a number of attributes from the perspective of a typical QS firm. For the purposes of this study, a 'typical' QS firm is defined by the following guidelines:

- small to medium sized firm with between 5 to 15 practitioners
- core business is QS services
- a presence in at least one main city



ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

EXTERNAL FORCES

This section considers the impact of forces in the external business environment on the success of typical quantity surveying firms.

For each factor, please indicate to what extent you consider it to be a threat (-) or an opportunity (+).

A factor can be considered a threat if it is likely to have a negative impact on the profitability or viability of QS business.

A factor can be considered an opportunity if it is likely to have a positive impact on the profitability or viability of QS business.

Please rate each factor in accordance with the following scale:

- 3 = large threat**
- 2 = medium threat**
- 1 = small threat**
- 0 = neutral/no impact**
- +1 = small opportunity**
- +2 = medium opportunity**
- +3 = large opportunity**

You may select "don't know" or skip any questions you are unable or unwilling to answer.

2. OUTSIDE FACTORS

How would you rate the effect of the following factors arising from 'outside' of the traditional QS industry on the success potential of QS firms.

| | -3 | -2 | -1 | 0 | +1 | +2 | +3 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| blurring boundaries with associated construction services (such as engineers or project/facilities/asset managers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the blurring market boundaries with non-construction professionals (lawyers, accountants, management consultants) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| demand from the non-building sectors of the construction industry (such as construction of mining, energy or transport infrastructure) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| demand from other industries (eg: manufacturing, events, healthcare, or disaster relief) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| demand for emerging environmental services (eg: carbon accounting, environmental economics, sustainability audits) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the barriers to entry for new competitors (such as professional registration, requisite knowledge, technology etc.) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

3. SUBSTITUTE FACTORS

How would you rate the effect of the following 'substitute' factors on the success potential of QS firms?

| | -3 | -2 | -1 | 0 | +1 | +2 | +3 | don't know |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| IT advances with the potential to replace some of the more process-oriented aspects of QS work | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| construction procurement options that may not require a traditional independent QS function (design-build or turnkey contracts) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| lead consultants (architects or project managers) who manage projects (in whole or in part) without independent QS involvement | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| developers and clients with their own cost management resources | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| publicly available construction cost data | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

4. SUPPLY FACTORS

How would you rate the effect of the following 'input' or 'supply-side' factors on the success potential of QS firms?

| | -3 | -2 | -1 | 0 | +1 | +2 | +3 | don't know |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| the style and quality of QS qualifications offered by tertiary education institutions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the availability of suitably skilled, qualified and experienced practitioners | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| IT advances that promise more efficient ways of working (such as Building Information Modeling) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| QS dependence on commissions and information from upstream service providers (such as architects or project managers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

5. DEMAND FACTORS

How would you rate the effect of the following 'client' or 'demand-side' factors on the success potential of QS firms?

| | -3 | -2 | -1 | 0 | +1 | +2 | +3 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| fluctuations in demand due to the cyclical nature of the construction industry | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the current level of recognition of - and demand for - QS services from private sector clients | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the current level of recognition of - and demand for - QS services from government / public sector | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the current level of recognition of - and demand for - QS services from associated professionals (architects / project managers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the current level of recognition of - and demand for - QS services from building contractors (and subcontractors) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the quantity surveyor's typical position on the construction supply chain (proximity to client) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| international demand for local QS service providers (particularly from the Asia-Pacific region) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |


other (if applicable)

6. INSIDE FACTORS




How would you rate the effect of the following factors involving 'existing competitors' or 'industry insiders' on the success potential of QS firms?

| | -3 | -2 | -1 | 0 | +1 | +2 | +3 | don't know |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| the quality of continuing professional development (CPD) programs offered by QS institutes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the quality of marketing and profile building initiatives by QS institutes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the current level of profession-wide collaboration on knowledge and data sharing and research | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the impact of QS practices which choose to compete on cost rather than quality (fee cutting) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the increasing number and size of 'large' QS firms | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| the current lifecycle stage of the traditional QS industry (growth or decline) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)



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ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

IMPORTANCE OF INTERNAL ATTRIBUTES

This section considers the IMPORTANCE of a range of internal attributes on the success of typical quantity surveying firms.

Please indicate the IMPORTANCE of each attribute in accordance with the following scale:

- 0 = no importance**
- 1 = minimum importance**
- 2 = below average importance**
- 3 = average importance**
- 4 = above average importance**
- 5 = maximum importance**

You may select "don't know" or skip any questions you are unable or unwilling to answer.

7. MANAGEMENT ATTRIBUTES - IMPORTANCE

How would you rate the importance of the following 'management' type attributes for the success of QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| effective top-down leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| acute awareness of trends and changes in the marketplace | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| formulation and implementation of strategic actions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| flexible and adaptable organisational structure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| effective human resource management | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| other (if applicable) | | | | | | | |

8. PEOPLE ATTRIBUTES - IMPORTANCE

How would you rate the importance of the following 'people' type attributes for the success of QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| interpersonal and relationship building skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| communication and presentation skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| accuracy, credibility and reliability | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| leadership and teamwork attributes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| honesty, trustworthiness and impartiality | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

9. NETWORK AND MARKETING ATTRIBUTES - IMPORTANCE

How would you rate the importance of the following 'networks' and 'marketing' type attributes for the success of QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| identification and relationship management of key clients | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| high quality client-base | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| extensive industry-wide networks (across clients, suppliers and partners/peers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| active marketing and brand promotion | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| international presence or connections (with clients, suppliers and partners/peers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

10. PRACTICE AND PROCESS ATTRIBUTES - IMPORTANCE

How would you rate the importance of the following 'practice' and 'process' attributes for the success of QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| knowledge capture and management systems (databases) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| efficient and reliable work methods (tools and templates) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| state of the art information technology systems | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| training and up-skilling initiatives | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| channels for capturing innovation and creativity | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |


other (if applicable)

11. CORE COMPETENCY ATTRIBUTES - IMPORTANCE


How would you rate the importance of the following 'core competency' type attributes for the success of QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| measurement and quantification skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| estimating and cost planning skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| project cost accounting and administration skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| cost knowledge (rates, labour constants) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| building knowledge (building technologies, processes, materials) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| statutory knowledge (construction law, standards, forms of contract) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |


other (if applicable)




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SURVEYORS



AUSTRALIAN
INSTITUTE
OF QUANTITY
SURVEYORS



SINGAPORE
INSTITUTE
OF SURVEYORS
& VALUERS

ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

PERFORMANCE OF INTERNAL ATTRIBUTES

This section considers how well QS firms typically PERFORM the internal attributes necessary for success.

Please indicate the typical level of PERFORMANCE of each attribute in accordance with the following scale:

0 = not at all
1 = very poor performance
2 = below average performance
3 = average performance
4 = above average performance
5 = excellent performance

You may select "don't know" or skip any questions you are unable or unwilling to answer.

12. MANAGEMENT ATTRIBUTES - PERFORMANCE
 How would you rate performance of the following 'management' type attributes within typical QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| effective top-down leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| acute awareness of trends and changes in the marketplace | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| formulation and implementation of strategic actions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| flexible and adaptable organisational structure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| effective human resource management | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| other (if applicable) | | | | | | | |

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13. PEOPLE ATTRIBUTES - PERFORMANCE

How would you rate the performance of the following 'people' type attributes within typical QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| interpersonal and relationship building skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| communication and presentation skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| accuracy, credibility and reliability | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| leadership and teamwork attributes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| honesty, trustworthiness and impartiality | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

14. NETWORK AND MARKETING ATTRIBUTES - PERFORMANCE

How would you rate the performance of the following 'networks' and 'marketing' type attributes within typical QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| identification and relationship management of key clients | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| high quality client-base | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| extensive industry-wide networks (across clients, suppliers and partners/peers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| active marketing and brand promotion | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| international presence or connections (with clients, suppliers and partners/peers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

15. PRACTICE AND PROCESS ATTRIBUTES - PERFORMANCE

How would you rate the performance of the following 'practice' and 'process' attributes within typical QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| knowledge capture and management systems (databases) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| efficient and reliable work methods (tools and templates) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| state of the art information technology systems | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| training and up-skilling initiatives | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| channels for capturing innovation and creativity | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)

16. CORE COMPETENCY ATTRIBUTES - PERFORMANCE

How would you rate the performance of the following 'core competency' type attributes within typical QS firms?

| | 0 | 1 | 2 | 3 | 4 | 5 | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| measurement and quantification skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| estimating and cost planning skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| project cost accounting and administration skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| cost knowledge (rates, labour constants) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| building knowledge (building technologies, processes, materials) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| statutory knowledge (construction law, standards, forms of contract) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

other (if applicable)



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ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

PERSONAL DEMOGRAPHICS

17. MEMBERSHIP GRADE

Which of the following best describes your membership grade?

- student / graduate / affiliate / probationer
- member / associate
- fellow / life member
- other (please specify)

18. EXPERIENCE

How many years of professional experience in the construction industry do you have?

- 0-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- 21 years or more

19. POSITION

Which of the following best describes your position within your organisation?

- cadet / junior professional
- intermediate professional
- senior professional / team leader / middle management
- general manager / director / chief executive
- sole practitioner
- other (please specify)

20. ORGANISATION

Which of the following best describes the organisation you work in?

- construction cost management consultancy
- diversified property services consultancy
- construction contractor or subcontractor
- client organisation
- bank or financier
- government (local/state/national)
- education provider
- other (please specify)

21. CURRENT ROLE

Which of the following best describes the main focus of your current role?

- cost management
- project management
- facilities or asset management
- property development
- legal / dispute resolution
- other (please specify)

22. LOCATION

Which of the following best describes your geographic location?

- Australia
- New Zealand
- Singapore
- United Kingdom
- other (please state country)



Massey University



ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

CONCLUSION

23. FUTURE RESEARCH PARTICIPATION

Future stages of this research require a smaller number of participants to complete a detailed cross-match analysis between the internal attributes and external forces. Should you be interested in participating in this next stage, please provide your email address in the field below (your contact details will not be used to for anything other than the stated purpose).

24. SUMMARY OF KEY FINDINGS

Should you wish to receive a summary of key findings, please provide your email address in the field below (your contact details will not be used to for anything other than the stated purpose).

25. ADDITIONAL FEEDBACK

Should you wish to provide the researchers with any additional feedback or comments, you may do so in the field below.



Massey University



ANALYSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING FIRMS

THANK YOU

Thank you for participating in this survey.

Please click the button below to submit your answers and exit this questionnaire.

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director, Research Ethics, telephone 06 350 5249, email: humanethics@massey.ac.nz.

Should you wish to direct any questions or feedback to the research team members, please do not hesitate to do so via the contacts listed below.

Marcel Frei (m.frei@massey.ac.nz)

Dr Jasper Mbachu (j.i.mbachu@massey.ac.nz)

Associate Professor Robyn Phipps (r.a.phipps@massey.ac.nz)

Appendix C Descriptive Survey – Follow-Up Observation (2020) Documents

| | |
|---|--|
| <p>Block 1</p> <p>INTRODUCTION</p> <p>Thank you for choosing to participate in this survey.</p> <p>The aim of this research is to develop the Strategic Health Index (SHI) as a tool to enable Quantity Surveying (QS) firms to diagnose their success potential and the steps required to improve it. This study draws on the views of members of Quantity Surveying institutes from Australia, New Zealand and Internationally.</p> <p>This questionnaire covers the key strengths, weaknesses, opportunities and threats (SWOT) faced by QS firms. It should take you around 15 minutes to complete. At the end of the questionnaire you will be given the opportunity to request a summary of the key findings and to enter a draw to receive one of three \$150 gift cards.</p> <p>Participation is anonymous and voluntary. You do not have to participate in this survey. If you decide to participate, you have the right to:</p> <ul style="list-style-type: none"> • decline to answer or discontinue the questionnaire at any time • ask any questions • provide information on the understanding that your name will not be connected with your answers • access a summary of the project findings <p>Default Question Block</p> <p>PROFESSIONAL AFFILIATION</p> <p>1. To enter the questionnaire, please indicate which of the following professional institutes and networks you are a member of:</p> | <ul style="list-style-type: none"> <input type="checkbox"/> AIQS (Australian Institute of Quantity Surveyors) <input type="checkbox"/> NZIQS (New Zealand Institute of Quantity Surveyors) <input type="checkbox"/> SISV (Singapore Institute of Surveyors and Valuers) <input type="checkbox"/> RICS (Royal Institute of Chartered Surveyors) <input type="checkbox"/> None of the above <p>Block 2</p> <p>THE 'TYPICAL' QS FIRM</p> <p>This questionnaire asks you to rate a number of factors as they relate to a typical QS firm.</p> <p>For the purposes of this study, think of a <u>TYPICAL</u> QS firm as the following:</p> <ul style="list-style-type: none"> • Size: at least a handful of employees (a small, medium or large firm with rather than a sole trader / sole proprietorship) • Discipline: may be a QS consultancy or a QS business unit within a larger multi-disciplinary organisation • Sectors: focus on vertical (buildings) construction but may also include horizontal (civil), residential, oil and gas, etc. <p>Block 3</p> <p>EXTERNAL FORCES</p> <p>This section considers the impact of forces in the external business environment on the success of typical QS firms.</p> <p>For each factor, please indicate to what extent you consider it to be a threat (-) or an opportunity (+).</p> <p>A factor can be considered a threat if it is likely to have a negative impact on the profitability or viability of QS business.</p> |
|---|--|

| | | | | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
| <p>A factor can be considered an opportunity if it is likely to have a positive impact on the profitability or viability of QS business.</p> <p>Please rate each factor in accordance with the following scale:</p> <p>-3 = Large threat -2 = Medium threat -1 = Small threat 0 = Neutral/no impact +1 = Small opportunity +2 = Medium opportunity +3 = Large opportunity</p> <p>You may skip questions you cannot answer.</p> | | | | | | | | |
| <p>OUTSIDE FACTORS</p> <p>How would you rate the effect of the following factors arising from 'outside' of the traditional QS industry on the success potential of QS firms.</p> | | | | | | | | |
| | -3 (large threat) | -2 | -1 | 0 (no impact) | +1 | +2 | +3 (large opportunity) | Don't know |
| Blurring boundaries with associated construction services (such as engineers or project/facilities/asset managers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Blurring market boundaries with non-construction professionals (lawyers, accountants, management consultants, financial services providers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <p>SUBSTITUTE FACTORS</p> <p>How would you rate the effect of the following 'substitute' factors on the success potential of QS firms?</p> | | | | | | | | |
| | -3 (large threat) | -2 | -1 | 0 (no impact) | +1 | +2 | +3 (large opportunity) | Don't know |
| Demand from the non-building sectors of the construction industry (such as mining, energy or transport infrastructure) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Demand from other industries (eg: manufacturing, events, healthcare, or disaster relief) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Demand for emerging environmental services (eg: carbon accounting, environmental economics, sustainability audits) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The barriers to entry for new competitors (such as professional registration, knowledge, technology etc.) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <p>Demand from the non-building sectors of the construction industry (such as mining, energy or transport infrastructure)</p> <p>Demand from other industries (eg: manufacturing, events, healthcare, or disaster relief)</p> <p>Demand for emerging environmental services (eg: carbon accounting, environmental economics, sustainability audits)</p> <p>The barriers to entry for new competitors (such as professional registration, knowledge, technology etc.)</p> | | | | | | | | |
| <p>IT advances with the potential to replace some of the more process-oriented aspects of QS work</p> | | | | | | | | |

| | -3 (large threat) | -2 | -1 | 0 (no impact) | +1 | +2 | +3 (large opportunity) | Don't know |
|--|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|-----------------------|
| Construction contracts or procurement approaches that require less QS involvement (eg turnkey design & build) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| IT advances that promise more efficient ways of working (such as Building Information Modeling) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The quality of design and information produced by other consultants (designers, project managers, etc) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| DEMAND FACTORS | | | | | | | | |
| How would you rate the effect of the following 'client' or 'demand-side' factors on the success potential of QS firms? | | | | | | | | |
| Publicly available construction cost data | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Changes in demand due to the cyclical nature of the construction industry | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Private sector clients' recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Government / public sector recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Associated professionals' (architects / project managers) recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Building contractors' (and subcontractors) recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| SUPPLY FACTORS | | | | | | | | |
| How would you rate the effect of the following 'input' or 'supply-side' factors on the success potential of QS firms? | | | | | | | | |
| Construction contracts or procurement approaches that require less QS involvement (eg turnkey design & build) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Lead consultants (architects or project managers) who manage projects (in whole or in part) without independent QS involvement | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Developers and clients with their own cost management resources | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Publicly available construction cost data | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Changes in demand due to the cyclical nature of the construction industry | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Private sector clients' recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Government / public sector recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Associated professionals' (architects / project managers) recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Building contractors' (and subcontractors) recognition of, and demand for QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | -3 (large threat) | -2 | -1 | 0 (no impact) | +1 | +2 | +3 (large opportunity) | Don't know |
|--|-----------------------|------------------------|------------------------------|------------------------|------------------------------|------------------------|---|-----------------------|
| The quantity surveyor's typical position on the construction supply chain (proximity to client) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| International demand for local QS service providers (particularly from other regions experiencing stronger economic growth) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| INSIDE FACTORS | | | | | | | | |
| How would you rate the effect of the following factors involving 'existing competitors' or 'industry insiders' on the success potential of QS firms? | | | | | | | | |
| | -3 (large threat) | -2 | -1 | 0 (no impact) | +1 | +2 | +3 (large opportunity) | Don't know |
| The quality of continuing professional development (CPD) programs offered by QS institutes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The quality of marketing and profile building initiatives by QS institutes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The current level of profession-wide collaboration on knowledge and data sharing and research | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The impact of QS practices which choose to compete on cost rather than quality (fee cutting) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Please indicate the IMPORTANCE of each attribute in accordance with the following scale: | | | | | | | | |
| | -3 (large threat) | -2 | -1 | 0 (no impact) | +1 | +2 | +3 (large opportunity) | Don't know |
| The increasing number and size of 'large' firms offering QS services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The current lifecycle stage of the traditional QS industry (growth or decline) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| IMPORTANCE OF INTERNAL ATTRIBUTES | | | | | | | | |
| This section considers the IMPORTANCE of a range of internal attributes on the success of typical quantity surveying firms. | | | | | | | | |
| Please indicate the IMPORTANCE of each attribute in accordance with the following scale: | | | | | | | | |
| | 0 = no importance | 1 = minimum importance | 2 = below average importance | 3 = average importance | 4 = above average importance | 5 = maximum importance | You may skip questions you cannot answer. | |
| MANAGEMENT ATTRIBUTES - IMPORTANCE | | | | | | | | |
| How would you rate the importance of the following 'management' type attributes for the success of QS firms? | | | | | | | | |
| | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) | Don't know | |
| Effective leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | NETWORK AND MARKETING ATTRIBUTES - IMPORTANCE | | | | | |
|--|------------|--|------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| | | How would you rate the importance of the following 'networks' and 'marketing' type attributes for the success of QS firms? | | | | | |
| | | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) |
| | | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) |
| Acute awareness of trends and changes in the marketplace | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Formulation and implementation of strategic actions | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Flexible and adaptable organisational structure | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc). | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| PEOPLE ATTRIBUTES - IMPORTANCE | | | | | | | |
| How would you rate the importance of the following 'people' type attributes for the success of QS firms? | | | | | | | |
| Interpersonal and relationship building skills, emotional intelligence | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Communication, presentation and negotiation skills | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Accuracy, credibility and reliability | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Leadership and teamwork attributes | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Honesty, trustworthiness and impartiality (ethical conduct) | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| | | PRACTICE AND PROCESS ATTRIBUTES - IMPORTANCE | | | | | |
| | | How would you rate the importance of the following 'practice' and 'process' attributes for the success of QS firms? | | | | | |
| | | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) |
| | | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) |
| Knowledge capture and management systems (databases) | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Efficient and reliable work methods (tools and templates) | Don't know | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | <p>This section considers how well QS firms typically PERFORM the internal attributes necessary for success.</p> <p>Please indicate the typical level of PERFORMANCE of each attribute in accordance with the following scale:</p> <p>0 = not at all 1 = very poor performance 2 = below average performance 3 = average performance 4 = above average performance 5 = excellent performance</p> <p>You may skip questions you cannot answer.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---------------------------|------------------------|-----------------------|-----------------------|------------------------|------------------------|------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <p>CORE COMPETENCY ATTRIBUTES - IMPORTANCE</p> | <p>MANAGEMENT ATTRIBUTES - ACTUAL PERFORMANCE</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>How would you rate the importance of the following 'core competency' type attributes for the success of QS firms?</p> | <p>How would you rate performance of the following 'management' type attributes by typical QS firms?</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="0"> <thead> <tr> <th></th> <th style="text-align: center;">0 (no importance)</th> <th style="text-align: center;">1 (minimum importance)</th> <th style="text-align: center;">2</th> <th style="text-align: center;">3</th> <th style="text-align: center;">4</th> <th style="text-align: center;">5 (maximum importance)</th> <th style="text-align: center;">Don't know</th> </tr> </thead> <tbody> <tr> <td>State of the art information technology systems</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Training and up-skilling initiatives</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Channels for capturing innovation and creativity</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> </tbody> </table> | | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) | Don't know | State of the art information technology systems | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Training and up-skilling initiatives | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Channels for capturing innovation and creativity | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <table border="0"> <thead> <tr> <th></th> <th style="text-align: center;">0 (not at all)</th> <th style="text-align: center;">1 (very poor performance)</th> <th style="text-align: center;">2</th> <th style="text-align: center;">3</th> <th style="text-align: center;">4</th> <th style="text-align: center;">5</th> <th style="text-align: center;">Don't know</th> </tr> </thead> <tbody> <tr> <td>Effective leadership</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Acute awareness of trends and changes in the marketplace</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Formulation and implementation of strategic actions</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Flexible and adaptable organisational structure</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc).</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> </tbody> </table> | | 0 (not at all) | 1 (very poor performance) | 2 | 3 | 4 | 5 | Don't know | Effective leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Acute awareness of trends and changes in the marketplace | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Formulation and implementation of strategic actions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Flexible and adaptable organisational structure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc). | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) | Don't know | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| State of the art information technology systems | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Training and up-skilling initiatives | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channels for capturing innovation and creativity | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 (not at all) | 1 (very poor performance) | 2 | 3 | 4 | 5 | Don't know | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Effective leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acute awareness of trends and changes in the marketplace | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Formulation and implementation of strategic actions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flexible and adaptable organisational structure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Effective human resource management (health, safety and wellbeing, performance management, reward and recognition, etc). | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="0"> <thead> <tr> <th></th> <th style="text-align: center;">0 (no importance)</th> <th style="text-align: center;">1 (minimum importance)</th> <th style="text-align: center;">2</th> <th style="text-align: center;">3</th> <th style="text-align: center;">4</th> <th style="text-align: center;">5 (maximum importance)</th> <th style="text-align: center;">Don't know</th> </tr> </thead> <tbody> <tr> <td>Measurement and quantification skills</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Estimating, cost planning and value and financial risk management skills</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Project financial administration, reporting and control skills</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Cost knowledge (rates, labour constants, market changes)</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Construction knowledge (technical, methodology, materials, risks)</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>Regulatory, legal and contractual knowledge and risk awareness</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> </tbody> </table> | | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) | Don't know | Measurement and quantification skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Estimating, cost planning and value and financial risk management skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Project financial administration, reporting and control skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Cost knowledge (rates, labour constants, market changes) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Construction knowledge (technical, methodology, materials, risks) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Regulatory, legal and contractual knowledge and risk awareness | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 (no importance) | 1 (minimum importance) | 2 | 3 | 4 | 5 (maximum importance) | Don't know | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement and quantification skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Estimating, cost planning and value and financial risk management skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Project financial administration, reporting and control skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cost knowledge (rates, labour constants, market changes) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction knowledge (technical, methodology, materials, risks) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Regulatory, legal and contractual knowledge and risk awareness | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| PEOPLE ATTRIBUTES - ACTUAL PERFORMANCE | | 0 (not at all) | 1 (very poor performance) | 2 | 3 | 4 | 5 | Don't know |
|--|--|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| How would you rate the performance of the following 'people' type attributes by typical QS firms? | | | | | | | | |
| International presence or connections (with clients, suppliers and partners/peers) | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| PRACTICE AND PROCESS ATTRIBUTES - ACTUAL PERFORMANCE | | | | | | | | |
| How would you rate the performance of the following 'practice' and 'process' attributes by typical QS firms? | | | | | | | | |
| Knowledge capture and management systems (databases) | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Efficient and reliable work methods (tools and templates) | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| State of the art information technology systems | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Training and up-skilling initiatives | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Channels for capturing innovation and creativity | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| CORE COMPETENCY ATTRIBUTES - ACTUAL PERFORMANCE | | | | | | | | |
| How would you rate the performance of the following 'core competency' type attributes by typical QS firms? | | | | | | | | |
| Measurement and quantification skills | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Estimating, cost planning and value and financial risk management skills | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| PEOPLE ATTRIBUTES - ACTUAL PERFORMANCE | | 0 (not at all) | 1 (very poor performance) | 2 | 3 | 4 | 5 | Don't know |
|---|--|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| How would you rate the performance of the following 'people' type attributes by typical QS firms? | | | | | | | | |
| Interpersonal and relationship building skills, emotional intelligence | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Communication, presentation and negotiation skills | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Accuracy, credibility and reliability | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Leadership and teamwork attributes | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Honesty, trustworthiness and impartiality (ethical conduct) | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| NETWORK AND MARKETING ATTRIBUTES - ACTUAL PERFORMANCE | | | | | | | | |
| How would you rate the performance of the following 'networks' and 'marketing' type attributes by typical QS firms? | | | | | | | | |
| Identification and relationship management of key clients | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| High quality client-base | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Extensive industry-wide networks (across clients, suppliers and partners/peers) | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Active marketing and brand promotion | | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | 0 (not at all) | 1 (very poor performance) | 2 | 3 | 4 | 5 | Don't know |
|---|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Project financial administration, reporting and control skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cost knowledge (rates, labour constants, market changes) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Construction knowledge (technical, methodology, materials, risks) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Regulatory, legal and contractual knowledge and risk awareness | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| RESPONDENT DEMOGRAPHICS | | | | | | | |
| MEMBERSHIP GRADE | | | | | | | |
| Which of the following best describes your membership grade? | | | | | | | |
| <input type="radio"/> Student / Graduate / Affiliate / Probationer | | | | | | | |
| <input type="radio"/> Member / Associate | | | | | | | |
| <input type="radio"/> Fellow / Life Member | | | | | | | |
| <input type="radio"/> Other (please specify) <input type="text"/> | | | | | | | |
| EXPERIENCE | | | | | | | |
| How many years of professional experience in the construction industry do you have? | | | | | | | |
| <input type="radio"/> 0 - 5 | | | | | | | |
| <input type="radio"/> 6 - 10 | | | | | | | |
| <input type="radio"/> 11 - 15 | | | | | | | |
| <input type="radio"/> 16 - 20 | | | | | | | |
| <input type="radio"/> 21 years or more | | | | | | | |
| POSITION | | | | | | | |
| Which of the following best describes your position within your organisation? | | | | | | | |
| <input type="radio"/> Cadet / Junior Professional | | | | | | | |
| <input type="radio"/> Intermediate Professional | | | | | | | |
| <input type="radio"/> Senior Professional / Team Leader | | | | | | | |
| <input type="radio"/> Senior Manager / Director / Principal | | | | | | | |
| <input type="radio"/> Sole Practitioner | | | | | | | |
| <input type="radio"/> Other (please specify) <input type="text"/> | | | | | | | |
| ORGANISATION | | | | | | | |
| Which of the following best describes the organisation you work in? | | | | | | | |
| <input type="radio"/> Construction cost management / QS consultancy | | | | | | | |
| <input type="radio"/> Construction / engineering / property services consultancy | | | | | | | |
| <input type="radio"/> Construction contractor or subcontractor | | | | | | | |
| <input type="radio"/> Private sector client organisation (investor, developer, etc) | | | | | | | |
| <input type="radio"/> Bank / lender | | | | | | | |
| <input type="radio"/> Public sector / Government | | | | | | | |
| <input type="radio"/> Tertiary education | | | | | | | |
| <input type="radio"/> Other (please specify) <input type="text"/> | | | | | | | |
| CURRENT ROLE | | | | | | | |
| Which of the following best describes the main FOCUS of your current role? | | | | | | | |
| <input type="radio"/> Cost management / quantity surveying | | | | | | | |
| <input type="radio"/> Project management | | | | | | | |
| <input type="radio"/> Facilities or asset management | | | | | | | |
| <input type="radio"/> Property development | | | | | | | |
| <input type="radio"/> Legal / dispute resolution | | | | | | | |
| <input type="radio"/> Other (please specify) <input type="text"/> | | | | | | | |

| | |
|--|---|
| <p>CONCLUSION</p> <p>SUMMARY OF KEY FINDINGS</p> <p>Enter your email address in the field below to receive a summary of key findings.</p> <input type="text"/> <p>\$150 GIFT CARD PRIZE DRAW</p> <p>Enter your email address in the field below to enter the draw to win one of three \$150 gift cards (local currency).</p> <input type="text"/> <p>ADDITIONAL FEEDBACK</p> <p>Should you wish to provide the researchers with any additional feedback or comments (including any questions on internal attributes or external forces you felt were missing), you may do so in the field below.</p> <input type="text"/> <p>Thank you for participating in this survey.</p> <p>Please click the button below to submit your answers and exit this questionnaire.</p> <p>This project has been evaluated by peer review and judged to be low risk. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researchers named in this document are responsible for the ethical conduct of this research.</p> <p>If you have any concerns about the conduct of this research that you want to raise with someone</p> | <p>other than the researchers, please contact Professor Craig Johnson, Director (Research Ethics), email humanethics@massey.ac.nz.</p> <p>Should you have any questions about this study, please do not hesitate to contact any of the research team members below:</p> <ul style="list-style-type: none"> • Marcel Frei (Marcel.Frei.1@uni.massey.ac.nz) • Professor Robyn Phipps (R.A.Phipps@massey.ac.nz) • Dr Hennie Van Heerden (A.VanHeerden@massey.ac.nz) <p>Powered by Qualtrics</p> |
|--|---|

Appendix D Evaluative Research – Case Study (2015) Documents

RESEARCH INFORMATION

CASE STUDY: ASSESSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING PRACTICES

All organisations must evolve in response to changes in their business environment. In order to remain relevant, globally competitive and successful, quantity surveyors must be able to scan their business landscape in order to identify and engage with imminent threats and opportunities. Previous stages of this research have developed a diagnostic tool enabling quantity surveying practices to diagnose their *strategic health* from SWOT analysis results, and identify the steps necessary to improve it.

The final stage of this research project requires the testing of the practical applicability of this model in a series of case study settings. To achieve this, we are dependent on your organisation's voluntary participation. By participating, your valuable input will contribute to the growth and development of the quantity surveying profession.

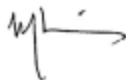
However, participation is entirely voluntary. Feedback from the interviews and questionnaires will be anonymous and used solely for academic research purposes; it will be treated with strict confidence and disposed of at the end of the research. No personal details of the participants or participating organisations will be associated to the responses. Organisations and individual respondents may choose to ask any questions, or withdraw from the study at any time.

The case study involves the distribution of the attached questionnaire to a small number of quantity surveying practices. The questionnaires will be administered via Survey Monkey and will take around 10-15 minutes to complete. Analysis of the gathered data will enable assessments to be made about the practical applications of the developed Strategic Health Index model and whether the research has achieved its original objectives. Participating organisations will remain anonymous and will not be identified in any publications.

In appreciation of your support of this research project, you will be provided with an early *pre-release* summary of the key research findings.

Should you have any further questions about the project, please do not hesitate to contact any member of the research team listed below.

Kind regards,



Marcel Frei

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This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director - Ethics, telephone 06 3569099 ext 86015, email humanethics@massey.ac.nz.



RESEARCH PARTICIPATION AND ACCESS (ORGANISATION)

CASE STUDY: ASSESSING THE STRATEGIC HEALTH OF QUANTITY SURVEYING PRACTICES

I have read the Research Information sheet for this project and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I hereby give permission for the research team to distribute questionnaires for the purpose of this study to employees of this organisation.

Signature:

Date:

Name

Position

Company/Organisation



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CASE STUDY: STRATEGIC HEALTH ANALYSIS OF QUANTITY SURVEYING PRACTICES

INTRODUCTION

Thank you for choosing to participate in this survey.

Previous stages of this research project have developed the Strategic Health Index (SHI) model as a tool to enable businesses offering quantity surveying (QS) services to diagnose their success potential and the steps required to improve it.

The aim of this stage of this research project is to test the real life application of the developed model. To achieve this, the following questionnaire covers the internal attributes and success indicators relevant to QS organisations. The questionnaire comprises three sections and should take you around 5-10 minutes to complete. You may select "don't know" for any question your are unable to answer.

Participation is anonymous and voluntary. At the conclusion of this questionnaire, you will have the opportunity to provide additional feedback, raise any questions or concerns, or request a summary of key findings.

Kind regards,

Marcel Frei - m.frei@massey.ac.nz

Dr Jasper Mbachu - j.i.mbachu@massey.ac.nz

Professor Robyn Phipps - r.a.phipps@massey.ac.nz



CASE STUDY: STRATEGIC HEALTH ANALYSIS OF QUANTITY SURVEYING PRACTICES

SECTION 1: INTERNAL ATTRIBUTES

This section considers how well your organisation performs the internal attributes necessary for success (as a provider of quantity surveying services).

1. Please rate your organisation's performance of the following **MANAGEMENT** attributes:

| | very poor | poor | fair | good | very good | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| effective top-down leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| acute awareness of trends and changes in the marketplace | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| formulation and implementation of strategic actions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| flexible and adaptable organisational structure | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| effective human resource management | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

2. Please rate your organisation's performance of the following **PEOPLE** attributes:

| | very poor | poor | fair | good | very good | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| interpersonal and relationship building skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| communication and presentation skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| accuracy, credibility and reliability | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| leadership and teamwork attributes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| honesty, trustworthiness and impartiality | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

3. Please rate your organisation's performance of the following NETWORK & MARKETING attributes:

| | very poor | poor | fair | good | very good | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| identification and relationship management of key clients | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| high quality client-base | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| extensive industry-wide networks (across clients, suppliers and partners/peers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| active marketing and brand promotion | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| international presence or connections (with clients, suppliers and partners/peers) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4. Please rate your organisation's performance of the following PRACTICE & PROCESS attributes:

| | very poor | poor | fair | good | very good | don't know |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| knowledge capture and management systems (databases) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| efficient and reliable work methods (tools and templates) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| state of the art information technology systems | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| training and up-skilling initiatives | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| channels for capturing innovation and creativity | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

5. Please rate your organisation's performance of the following CORE COMPETENCY attributes:

| | very poor | poor | fair | good | very good | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| measurement and quantification skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| estimating and cost planning skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| project cost accounting and administration skills | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| cost knowledge (rates, labour constants) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| building knowledge (building technologies, processes, materials) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| statutory knowledge (construction law, standards, forms of contract) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



CASE STUDY: STRATEGIC HEALTH ANALYSIS OF QUANTITY SURVEYING PRACTICES

SECTION 2: SUCCESS INDICATORS

This section measures the success of your organisation across a range of performance indicators.

6. How would you rate your organisation's performance in terms of:

| | very poor | poor | fair | good | very good | don't know |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Generating repeat business from existing clients | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Receiving good client feedback | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Employee retention | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Employee satisfaction | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ability to charge a good fee for services | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Operating effectively and efficiently | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

7. How would you describe any changes to your organisation's activity over the past 1 - 3 years, in terms of the following:

| | significant decrease | moderate decrease | slight decrease | no change | slight increase | moderate increase | significant increase | don't know |
|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Workload | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Employee numbers | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Size of client base | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

8. How would you rate your organisation's overall success:

| | very poor | poor | fair | good | very good | don't know |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Overall success | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



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CASE STUDY: STRATEGIC HEALTH ANALYSIS OF QUANTITY SURVEYING PRACTICES

SECTION 3: PERSONAL DEMOGRAPHICS

9. How long have you been with this organisation?

- Less than one year
- One to five years
- More than five years

10. Which of the following best describes your main responsibilities within the organisation?

- Provision of quantity surveying services
- Provision of other (non quantity surveying) core services
- Provision of internal business support services
- Other (please specify)

11. Which of the following best describes your relationship to the organisation?

- employee / contractor
- director / principal / owner
- Other (please specify)



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CASE STUDY: STRATEGIC HEALTH ANALYSIS OF QUANTITY SURVEYING PRACTICES

THANK YOU

Thank you for participating in this survey. Please click the button below to submit your answers and exit this questionnaire.

DISCLAIMER: This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researchers named in this document are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you want to raise with someone other than the researchers, please contact Dr Brian Finch, Director - Ethics, telephone 06 3569099 ext 86015, email humanethics@massey.ac.nz.

Should you wish to direct any questions or feedback to the research team members, please do so using the text box provided or directly via the contacts listed below.

Thank you,

Marcel Frei - m.frei@massey.ac.nz

Dr Jasper Mbachu - j.i.mbachu@massey.ac.nz

Professor Robyn Phipps - r.a.phipps@massey.ac.nz

12. SUMMARY OF KEY FINDINGS

Should you wish to receive a summary of key findings, please provide your email address in the field below (your contact details will not be used for statistical analysis).

13. ADDITIONAL FEEDBACK

Should you wish to provide the researchers with any additional feedback or comments, you may do so in the field below.

Appendix E Tests of Normality – Descriptive Research, Original Observation Data

Table 91: Tests of Normality – External Factor Impact Rating Data

| External Factor | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|------------------------------|---------------------------------|-----|-------|--------------|-----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Associated professions | 0.170 | 103 | 0.000 | 0.921 | 103 | 0.000 |
| Non-construction professions | 0.140 | 102 | 0.000 | 0.950 | 102 | 0.001 |
| Non-building | 0.211 | 93 | 0.000 | 0.893 | 93 | 0.000 |
| Other industries | 0.172 | 98 | 0.000 | 0.890 | 98 | 0.000 |
| Environmental services | 0.172 | 96 | 0.000 | 0.910 | 96 | 0.000 |
| Barriers to entry | 0.164 | 98 | 0.000 | 0.943 | 98 | 0.000 |
| IT substitutions | 0.209 | 101 | 0.000 | 0.890 | 101 | 0.000 |
| Non-traditional procurement | 0.148 | 101 | 0.000 | 0.936 | 101 | 0.000 |
| Lead consultants | 0.221 | 102 | 0.000 | 0.885 | 102 | 0.000 |
| In-house QS | 0.213 | 101 | 0.000 | 0.909 | 101 | 0.000 |
| Public cost data | 0.215 | 99 | 0.000 | 0.926 | 99 | 0.000 |
| Qualifications | 0.141 | 96 | 0.000 | 0.937 | 96 | 0.000 |
| Employment market | 0.190 | 97 | 0.000 | 0.894 | 97 | 0.000 |
| IT advances | 0.190 | 97 | 0.000 | 0.901 | 97 | 0.000 |
| Upstream information | 0.181 | 98 | 0.000 | 0.936 | 98 | 0.000 |
| Industry cycles | 0.140 | 97 | 0.000 | 0.932 | 97 | 0.000 |
| Private sector | 0.159 | 96 | 0.000 | 0.922 | 96 | 0.000 |
| Public sector | 0.178 | 95 | 0.000 | 0.918 | 95 | 0.000 |
| Associated professionals | 0.161 | 97 | 0.000 | 0.932 | 97 | 0.000 |
| Contractor demand | 0.151 | 97 | 0.000 | 0.935 | 97 | 0.000 |
| Supply chain position | 0.144 | 96 | 0.000 | 0.924 | 96 | 0.000 |
| International demand | 0.180 | 88 | 0.000 | 0.921 | 88 | 0.000 |
| Institute CPD | 0.180 | 96 | 0.000 | 0.928 | 96 | 0.000 |
| Institute profile | 0.196 | 94 | 0.000 | 0.920 | 94 | 0.000 |
| Professional collaboration | 0.136 | 92 | 0.000 | 0.942 | 92 | 0.000 |
| Price competition | 0.211 | 95 | 0.000 | 0.842 | 95 | 0.000 |
| Large firms | 0.156 | 95 | 0.000 | 0.940 | 95 | 0.000 |
| Profession lifecycle | 0.195 | 93 | 0.000 | 0.943 | 93 | 0.000 |

a. Lilliefors Significance Correction

Table 92: Tests of Normality – Internal Factor Importance Rating Data

| Internal Factor | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|-------------------------|---------------------------------|----|-------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership | 0.248 | 89 | 0.000 | 0.791 | 89 | 0.000 |
| Market awareness | 0.245 | 89 | 0.000 | 0.798 | 89 | 0.000 |
| Strategic management | 0.282 | 90 | 0.000 | 0.853 | 90 | 0.000 |
| Firm flexibility | 0.236 | 88 | 0.000 | 0.817 | 88 | 0.000 |
| People management | 0.226 | 88 | 0.000 | 0.842 | 88 | 0.000 |
| Interpersonal skill | 0.279 | 90 | 0.000 | 0.795 | 90 | 0.000 |
| Communication skill | 0.328 | 90 | 0.000 | 0.742 | 90 | 0.000 |
| Rigour | 0.427 | 90 | 0.000 | 0.615 | 90 | 0.000 |
| Teamwork | 0.247 | 90 | 0.000 | 0.809 | 90 | 0.000 |
| Ethical conduct | 0.431 | 91 | 0.000 | 0.596 | 91 | 0.000 |
| Relationship management | 0.306 | 91 | 0.000 | 0.758 | 91 | 0.000 |
| Client quality | 0.241 | 90 | 0.000 | 0.832 | 90 | 0.000 |
| Networks | 0.243 | 89 | 0.000 | 0.825 | 89 | 0.000 |
| Brand | 0.200 | 90 | 0.000 | 0.885 | 90 | 0.000 |
| International reach | 0.159 | 90 | 0.000 | 0.915 | 90 | 0.000 |
| Knowledge management | 0.243 | 89 | 0.000 | 0.829 | 89 | 0.000 |
| Work methods | 0.246 | 89 | 0.000 | 0.801 | 89 | 0.000 |
| IT systems | 0.192 | 90 | 0.000 | 0.882 | 90 | 0.000 |
| Training | 0.264 | 89 | 0.000 | 0.787 | 89 | 0.000 |
| Innovation capture | 0.246 | 88 | 0.000 | 0.873 | 88 | 0.000 |
| Measurement ability | 0.299 | 90 | 0.000 | 0.773 | 90 | 0.000 |
| Estimating ability | 0.424 | 91 | 0.000 | 0.549 | 91 | 0.000 |
| Cost control ability | 0.340 | 89 | 0.000 | 0.699 | 89 | 0.000 |
| Cost knowledge | 0.293 | 90 | 0.000 | 0.788 | 90 | 0.000 |
| Construction knowledge | 0.278 | 90 | 0.000 | 0.781 | 90 | 0.000 |
| Legal knowledge | 0.233 | 90 | 0.000 | 0.822 | 90 | 0.000 |

a. Lilliefors Significance Correction

Table 93: Tests of Normality – Internal Factor Performance Rating Data

| Internal Factor | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|-------------------------|---------------------------------|----|-------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership | 0.169 | 76 | 0.000 | 0.906 | 76 | 0.000 |
| Market awareness | 0.198 | 77 | 0.000 | 0.895 | 77 | 0.000 |
| Strategic management | 0.200 | 77 | 0.000 | 0.896 | 77 | 0.000 |
| Firm flexibility | 0.187 | 77 | 0.000 | 0.904 | 77 | 0.000 |
| People management | 0.175 | 76 | 0.000 | 0.926 | 76 | 0.000 |
| Interpersonal skill | 0.247 | 76 | 0.000 | 0.868 | 76 | 0.000 |
| Communication skill | 0.249 | 75 | 0.000 | 0.880 | 75 | 0.000 |
| Rigour | 0.240 | 74 | 0.000 | 0.830 | 74 | 0.000 |
| Teamwork | 0.224 | 76 | 0.000 | 0.873 | 76 | 0.000 |
| Ethical conduct | 0.257 | 77 | 0.000 | 0.792 | 77 | 0.000 |
| Relationship management | 0.217 | 78 | 0.000 | 0.831 | 78 | 0.000 |
| Client quality | 0.231 | 78 | 0.000 | 0.889 | 78 | 0.000 |
| Networks | 0.206 | 77 | 0.000 | 0.892 | 77 | 0.000 |
| Brand | 0.162 | 78 | 0.000 | 0.911 | 78 | 0.000 |
| International reach | 0.178 | 75 | 0.000 | 0.922 | 75 | 0.000 |
| Knowledge management | 0.199 | 76 | 0.000 | 0.899 | 76 | 0.000 |
| Work methods | 0.218 | 76 | 0.000 | 0.867 | 76 | 0.000 |
| IT systems | 0.216 | 75 | 0.000 | 0.905 | 75 | 0.000 |
| Training | 0.168 | 75 | 0.000 | 0.910 | 75 | 0.000 |
| Innovation capture | 0.152 | 76 | 0.000 | 0.928 | 76 | 0.000 |
| Measurement ability | 0.233 | 78 | 0.000 | 0.846 | 78 | 0.000 |
| Estimating ability | 0.232 | 78 | 0.000 | 0.838 | 78 | 0.000 |
| Cost control ability | 0.218 | 77 | 0.000 | 0.864 | 77 | 0.000 |
| Cost knowledge | 0.206 | 77 | 0.000 | 0.879 | 77 | 0.000 |
| Construction knowledge | 0.165 | 78 | 0.000 | 0.891 | 78 | 0.000 |
| Legal knowledge | 0.203 | 77 | 0.000 | 0.890 | 77 | 0.000 |

a. Lilliefors Significance Correction

Appendix F External Factor Polarised Impact Ratings – Original Observation

Table 94: External Factor Impact Ratings – Difference of Perception Between NZIQS and non-NZIQS Respondents (Full Table)

| External Factor Impact | NZIQS | | | | Non-NZIQS | | | | rank var. | U | p |
|------------------------------|-----------|--------------|-------------|--------------|-----------|-------------|-------------|-----------|------------|------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Associated professions | 48 | -0.08 | 0.57 | 22.00 | 55 | -0.18 | 0.64 | 24 | 2 | 1,178 | 0.341 |
| Non-construction professions | 47 | -0.10 | 0.46 | 23.00 | 55 | -0.13 | 0.53 | 22 | -1 | 1,250 | 0.771 |
| Non-building | 46 | 0.52 | 0.41 | 1.00 | 47 | 0.49 | 0.42 | 1 | - | 1,029 | 0.677 |
| Other industries | 47 | 0.52 | 0.40 | 2.00 | 51 | 0.25 | 0.52 | 8 | 6 | 862 | 0.014 |
| Environmental services | 42 | 0.47 | 0.40 | 3.00 | 54 | 0.35 | 0.51 | 3 | - | 1,037 | 0.462 |
| Barriers to entry | 45 | 0.15 | 0.41 | 13.00 | 53 | 0.11 | 0.55 | 16 | 3 | 1,185 | 0.953 |
| IT substitutions | 46 | 0.36 | 0.56 | 5.00 | 55 | 0.29 | 0.60 | 5 | - | 1,200 | 0.651 |
| Non-traditional procurement | 46 | -0.01 | 0.56 | 20.00 | 55 | -0.15 | 0.61 | 23 | 3 | 1,092 | 0.232 |
| Lead consultants | 47 | -0.37 | 0.51 | 27.00 | 55 | -0.32 | 0.60 | 27 | - | 1,266 | 0.855 |
| In-house QS | 46 | -0.36 | 0.45 | 26.00 | 55 | -0.27 | 0.58 | 25 | -1 | 1,181 | 0.556 |
| Public cost data | 46 | -0.14 | 0.45 | 24.00 | 53 | 0.14 | 0.48 | 14 | -10 | 801 | 0.002 |
| Qualifications | 44 | 0.20 | 0.48 | 10.00 | 52 | 0.06 | 0.65 | 17 | 7 | 1,036 | 0.418 |
| Employment market | 45 | 0.09 | 0.65 | 18.00 | 52 | 0.16 | 0.70 | 13 | -5 | 1,132 | 0.780 |
| IT advances | 46 | 0.41 | 0.42 | 4.00 | 51 | 0.44 | 0.46 | 2 | -2 | 1,096 | 0.566 |
| Upstream information | 46 | -0.04 | 0.51 | 21.00 | 52 | -0.03 | 0.56 | 19 | -2 | 1,159 | 0.785 |
| Industry cycles | 44 | -0.20 | 0.47 | 25.00 | 53 | -0.30 | 0.53 | 26 | 1 | 1,059 | 0.428 |
| Private sector | 43 | 0.10 | 0.63 | 16.00 | 53 | 0.03 | 0.55 | 18 | 2 | 1,055 | 0.527 |
| Public sector | 42 | 0.21 | 0.61 | 9.00 | 53 | 0.14 | 0.56 | 14 | 5 | 1,041 | 0.580 |
| Associated professionals | 44 | 0.22 | 0.51 | 8.00 | 53 | 0.19 | 0.58 | 12 | 4 | 1,151 | 0.909 |
| Contractor demand | 45 | 0.17 | 0.56 | 12.00 | 52 | 0.23 | 0.50 | 10 | -2 | 1,085 | 0.531 |
| Supply chain position | 43 | 0.23 | 0.62 | 7.00 | 53 | 0.24 | 0.56 | 9 | 2 | 1,135 | 0.973 |
| International demand | 42 | 0.29 | 0.55 | 6.00 | 46 | 0.33 | 0.52 | 4 | -2 | 940 | 0.825 |
| Institute CPD | 44 | 0.17 | 0.53 | 11.00 | 52 | 0.28 | 0.53 | 6 | -5 | 1,023 | 0.361 |
| Institute profile | 43 | 0.14 | 0.55 | 14.00 | 51 | 0.27 | 0.55 | 7 | -7 | 930 | 0.198 |
| Professional collaboration | 43 | 0.09 | 0.51 | 17.00 | 49 | 0.21 | 0.59 | 11 | -6 | 902 | 0.229 |
| Price competition | 43 | -0.38 | 0.58 | 28.00 | 52 | -0.45 | 0.60 | 28 | - | 996 | 0.349 |
| Large firms | 42 | - | 0.49 | 19.00 | 53 | -0.07 | 0.60 | 21 | 2 | 1,050 | 0.631 |
| Profession lifecycle | 41 | 0.11 | 0.44 | 15.00 | 52 | -0.05 | 0.52 | 20 | 5 | 875 | 0.128 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Table 95: External Factor Impact Ratings – Difference of Perception Between Emerging and Highly Experienced Respondents (Full Table)

| External Factor Impact | Emerging Professionals | | | | Senior Professionals | | | | rank var. | U | p |
|--|------------------------|-------------|-------------|--------------|----------------------|--------------|-------------|-----------|-----------|--------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Associated professions | 33 | -0.02 | 0.64 | 23.00 | 54 | -0.19 | 0.59 | 24 | 1 | 757.0 | 0.235 |
| Non-construction professions | 32 | -0.03 | 0.48 | 24.00 | 54 | -0.18 | 0.50 | 23 | -1 | 727.5 | 0.213 |
| Non-building | 29 | 0.53 | 0.40 | 2.00 | 52 | 0.49 | 0.43 | 1 | -1 | 726.0 | 0.776 |
| Other industries | 31 | 0.34 | 0.43 | 4.00 | 52 | 0.47 | 0.42 | 2 | -2 | 669.5 | 0.186 |
| Environmental services | 31 | 0.38 | 0.48 | 3.00 | 51 | 0.45 | 0.45 | 3 | - | 717.5 | 0.474 |
| Barriers to entry | 30 | 0.13 | 0.47 | 17.00 | 54 | 0.14 | 0.45 | 12 | -5 | 801.5 | 0.935 |
| IT substitutions | 31 | 0.34 | 0.60 | 4.00 | 54 | 0.33 | 0.55 | 5 | 1 | 807.5 | 0.783 |
| Non-traditional procurement | 31 | -0.18 | 0.65 | 25.00 | 54 | -0.09 | 0.52 | 21 | -4 | 746.5 | 0.402 |
| Lead consultants | 32 | -0.29 | 0.65 | 27.00 | 54 | -0.45 | 0.45 | 27 | - | 785.0 | 0.467 |
| In-house QS | 31 | -0.30 | 0.66 | 28.00 | 54 | -0.34 | 0.45 | 25 | -3 | 809.5 | 0.796 |
| Public cost data | 31 | 0.08 | 0.55 | 21.00 | 54 | -0.05 | 0.47 | 18 | -3 | 740.0 | 0.361 |
| Qualifications | 28 | 0.15 | 0.62 | 16.00 | 54 | 0.13 | 0.54 | 13 | -3 | 749.0 | 0.945 |
| Employment market | 29 | 0.20 | 0.66 | 15.00 | 53 | 0.08 | 0.68 | 16 | 1 | 703.0 | 0.519 |
| IT advances | 29 | 0.54 | 0.38 | 1.00 | 53 | 0.42 | 0.40 | 4 | 3 | 628.5 | 0.159 |
| Upstream information | 30 | 0.10 | 0.61 | 19.00 | 54 | -0.07 | 0.51 | 19 | - | 659.0 | 0.151 |
| Industry cycles | 30 | 0.02 | 0.58 | 22.00 | 54 | -0.38 | 0.41 | 26 | 4 | 474.0 | 0.001 |
| Private sector | 29 | 0.10 | 0.61 | 18.00 | 54 | 0.02 | 0.61 | 17 | -1 | 726.0 | 0.581 |
| Public sector | 28 | 0.26 | 0.58 | 11.00 | 54 | 0.13 | 0.59 | 13 | 2 | 647.0 | 0.278 |
| Associated professionals | 30 | 0.30 | 0.61 | 10.00 | 54 | 0.20 | 0.50 | 9 | -1 | 706.5 | 0.326 |
| Contractor demand | 31 | 0.31 | 0.60 | 9.00 | 53 | 0.19 | 0.46 | 10 | 1 | 648.0 | 0.100 |
| Supply chain position | 29 | 0.33 | 0.53 | 7.00 | 54 | 0.22 | 0.63 | 7 | - | 716.0 | 0.516 |
| International demand | 27 | 0.32 | 0.61 | 8.00 | 49 | 0.33 | 0.49 | 6 | -2 | 645.5 | 0.860 |
| Institute CPD | 31 | 0.34 | 0.51 | 4.00 | 52 | 0.19 | 0.50 | 11 | 7 | 673.0 | 0.199 |
| Institute profile | 31 | 0.22 | 0.53 | 13.00 | 52 | 0.22 | 0.57 | 8 | -5 | 776.5 | 0.777 |
| Professional collaboration | 31 | 0.24 | 0.60 | 12.00 | 51 | 0.12 | 0.52 | 15 | 3 | 700.0 | 0.379 |
| Price competition | 30 | -0.21 | 0.70 | 26.00 | 53 | -0.53 | 0.47 | 28 | 2 | 611.0 | 0.073 |
| Large firms | 31 | 0.09 | 0.59 | 20.00 | 51 | -0.10 | 0.52 | 22 | 2 | 645.0 | 0.156 |
| Profession lifecycle | 30 | 0.21 | 0.49 | 14.00 | 50 | -0.08 | 0.42 | 20 | 6 | 500.0 | 0.011 |
| U = Mann-Whitney U | | | | | | | | | | | |
| p = 2-tailed Asymptotic Significance (p-value) | | | | | | | | | | | |

Table 96: External Factor Impact Ratings – Difference of Perception Between Consulting Quantity Surveyors and Others (Full Table)

| External Factor Impact | Consulting QS | | | | Non-Consulting QS | | | | rank var. | U | p |
|--|---------------|--------------|-------------|--------------|-------------------|-------------|-------------|----------|------------|------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Associated professions | 45 | -0.19 | 0.57 | 23.00 | 42 | 0.17 | 0.65 | 20 | -3 | 845 | 0.389 |
| Non-construction professions | 44 | -0.08 | 0.47 | 22.00 | 42 | 0.05 | 1.06 | 24 | 2 | 823 | 0.373 |
| Non-building | 43 | 0.49 | 0.40 | 1.00 | 38 | 0.59 | 0.54 | 2 | 1 | 753 | 0.529 |
| Other industries | 43 | 0.42 | 0.42 | 2.00 | 40 | 0.50 | 0.50 | 6 | 4 | 829 | 0.771 |
| Environmental services | 43 | 0.40 | 0.44 | 4.00 | 39 | 0.54 | 0.51 | 3 | -1 | 781 | 0.584 |
| Barriers to entry | 43 | 0.13 | 0.39 | 13.00 | 41 | 0.29 | 0.68 | 16 | 3 | 842 | 0.716 |
| IT substitutions | 44 | 0.25 | 0.54 | 6.00 | 41 | 0.52 | 0.59 | 5 | -1 | 710 | 0.084 |
| Non-traditional procurement | 44 | -0.19 | 0.56 | 24.00 | 41 | 0.19 | 1.16 | 18 | -6 | 794 | 0.333 |
| Lead consultants | 45 | -0.36 | 0.57 | 27.00 | 41 | -0.17 | 1.32 | 28 | 1 | 890 | 0.772 |
| In-house QS | 44 | -0.33 | 0.55 | 26.00 | 41 | -0.08 | 1.26 | 26 | - | 856 | 0.674 |
| Public cost data | 44 | 0.05 | 0.49 | 18.00 | 41 | 0.14 | 0.88 | 22 | 4 | 770 | 0.230 |
| Qualifications | 42 | 0.10 | 0.50 | 14.00 | 40 | 0.35 | 0.79 | 14 | - | 732 | 0.306 |
| Employment market | 42 | -0.06 | 0.63 | 21.00 | 40 | 0.54 | 1.06 | 4 | -17 | 578 | 0.013 |
| IT advances | 42 | 0.41 | 0.34 | 3.00 | 40 | 0.59 | 0.50 | 1 | -2 | 676 | 0.114 |
| Upstream information | 43 | 0.08 | 0.51 | 17.00 | 41 | 0.09 | 0.88 | 23 | 6 | 724 | 0.150 |
| Industry cycles | 43 | -0.22 | 0.45 | 25.00 | 41 | -0.01 | 1.23 | 25 | - | 839 | 0.698 |
| Private sector | 43 | 0.09 | 0.58 | 15.00 | 40 | 0.18 | 0.84 | 19 | 4 | 797 | 0.557 |
| Public sector | 42 | 0.17 | 0.56 | 11.00 | 40 | 0.32 | 0.70 | 15 | 4 | 812 | 0.792 |
| Associated professionals | 43 | 0.21 | 0.56 | 9.00 | 41 | 0.39 | 0.57 | 12 | 3 | 824 | 0.601 |
| Contractor demand | 44 | 0.21 | 0.50 | 8.00 | 40 | 0.38 | 0.56 | 13 | 5 | 823 | 0.599 |
| Supply chain position | 43 | 0.22 | 0.55 | 7.00 | 40 | 0.42 | 0.66 | 10 | 3 | 756 | 0.334 |
| International demand | 40 | 0.29 | 0.54 | 5.00 | 36 | 0.47 | 0.54 | 7 | 2 | 666 | 0.567 |
| Institute CPD | 43 | 0.20 | 0.54 | 10.00 | 40 | 0.43 | 0.56 | 8 | -2 | 771 | 0.405 |
| Institute profile | 42 | 0.16 | 0.55 | 12.00 | 41 | 0.42 | 0.67 | 9 | -3 | 738 | 0.253 |
| Professional collaboration | 43 | 0.09 | 0.48 | 15.00 | 39 | 0.42 | 0.81 | 11 | -4 | 695 | 0.174 |
| Price competition | 43 | -0.40 | 0.62 | 28.00 | 40 | -0.15 | 1.39 | 27 | -1 | 856 | 0.966 |
| Large firms | 43 | 0.02 | 0.60 | 20.00 | 39 | 0.14 | 0.97 | 21 | 1 | 756 | 0.432 |
| Profession lifecycle | 42 | 0.04 | 0.47 | 19.00 | 38 | 0.23 | 0.91 | 17 | -2 | 763 | 0.729 |
| U = Mann-Whitney U p = 2-tailed Asymptotic Significance (p-value) | | | | | | | | | | | |

Appendix G Internal Factor Importance Ratings – Original Observation

Table 97: Internal Factor Importance – Difference of Perception Between NZIQS and non-NZIQS Respondents (Full Table)

| Internal Factor Importance | NZIQS | | | | Non-NZIQS | | | | rank var. | U | p |
|----------------------------|-----------|-------------|-------------|--------------|-----------|-------------|-------------|-----------|------------|------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Leadership | 42 | 1.40 | 0.39 | 15.00 | 47 | 1.22 | 0.42 | 24 | 9 | 714 | 0.018 |
| Market awareness | 42 | 1.37 | 0.34 | 17.00 | 47 | 1.36 | 0.32 | 14 | -3 | 955 | 0.776 |
| Strategic management | 43 | 1.26 | 0.30 | 23.00 | 47 | 1.31 | 0.29 | 20 | -3 | 933 | 0.500 |
| Firm flexibility | 41 | 1.42 | 0.26 | 13.00 | 47 | 1.34 | 0.31 | 19 | 6 | 830 | 0.230 |
| People management | 42 | 1.33 | 0.30 | 19.00 | 46 | 1.30 | 0.26 | 21 | 2 | 891 | 0.502 |
| Interpersonal skill | 43 | 1.46 | 0.25 | 8.00 | 47 | 1.38 | 0.28 | 11 | 3 | 860 | 0.186 |
| Communication skill | 43 | 1.52 | 0.21 | 4.00 | 47 | 1.43 | 0.23 | 6 | 2 | 799 | 0.056 |
| Rigour | 43 | 1.60 | 0.16 | 1.00 | 47 | 1.49 | 0.26 | 3 | 2 | 796 | 0.029 |
| Teamwork | 43 | 1.43 | 0.27 | 12.00 | 47 | 1.35 | 0.29 | 15 | 3 | 854 | 0.174 |
| Ethical conduct | 44 | 1.59 | 0.19 | 2.00 | 47 | 1.49 | 0.27 | 3 | 1 | 832 | 0.040 |
| Relationship management | 44 | 1.47 | 0.21 | 7.00 | 47 | 1.45 | 0.24 | 5 | -2 | 1,002 | 0.779 |
| Client quality | 43 | 1.27 | 0.32 | 22.00 | 47 | 1.40 | 0.29 | 8 | -14 | 771 | 0.041 |
| Networks | 43 | 1.35 | 0.27 | 18.00 | 46 | 1.39 | 0.30 | 9 | -9 | 887 | 0.373 |
| Brand | 43 | 1.25 | 0.29 | 24.00 | 47 | 1.22 | 0.35 | 24 | - | 977 | 0.774 |
| International reach | 43 | 1.00 | 0.42 | 26.00 | 47 | 1.15 | 0.47 | 26 | - | 803 | 0.086 |
| Knowledge management | 42 | 1.29 | 0.35 | 20.00 | 47 | 1.41 | 0.24 | 7 | -13 | 814 | 0.132 |
| Work methods | 42 | 1.44 | 0.26 | 11.00 | 47 | 1.35 | 0.29 | 15 | 4 | 827 | 0.154 |
| IT systems | 43 | 1.19 | 0.33 | 25.00 | 47 | 1.23 | 0.37 | 23 | -2 | 936 | 0.527 |
| Training | 42 | 1.42 | 0.23 | 14.00 | 47 | 1.38 | 0.32 | 12 | -2 | 947 | 0.720 |
| Innovation capture | 42 | 1.29 | 0.33 | 21.00 | 46 | 1.24 | 0.33 | 22 | 1 | 896 | 0.535 |
| Measurement ability | 43 | 1.49 | 0.26 | 5.00 | 47 | 1.37 | 0.30 | 13 | 8 | 783 | 0.044 |
| Estimating ability | 44 | 1.55 | 0.25 | 3.00 | 47 | 1.56 | 0.17 | 1 | -2 | 994 | 0.679 |
| Cost control ability | 43 | 1.48 | 0.28 | 6.00 | 46 | 1.49 | 0.22 | 2 | -4 | 979 | 0.926 |
| Cost knowledge | 43 | 1.46 | 0.26 | 8.00 | 47 | 1.39 | 0.28 | 10 | 2 | 874 | 0.230 |
| Construction knowledge | 43 | 1.46 | 0.29 | 8.00 | 47 | 1.35 | 0.33 | 17 | 9 | 814 | 0.086 |
| Legal knowledge | 43 | 1.40 | 0.27 | 16.00 | 47 | 1.35 | 0.31 | 17 | 1 | 933 | 0.504 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Table 98: Internal Factor Importance – Difference of Perception Between Emerging and Highly Experienced Respondents (Full Table)

| Internal Factor Importance | Emerging Professionals | | | | Senior Professionals | | | | rank var. | U | p |
|------------------------------------|------------------------|-------------|-------------|-------------|----------------------|-------------|-------------|-----------|-----------|--------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Leadership | 30 | 1.26 | 0.43 | 24.00 | 53 | 1.37 | 0.37 | 15 | -9 | 661.5 | 0.179 |
| Market awareness | 30 | 1.34 | 0.40 | 19.00 | 53 | 1.40 | 0.29 | 9 | -10 | 768.5 | 0.787 |
| Strategic management | 31 | 1.29 | 0.37 | 21.00 | 53 | 1.29 | 0.25 | 22 | 1 | 772.0 | 0.621 |
| <i>Firm flexibility</i> | 29 | 1.48 | 0.23 | 7.00 | 53 | 1.33 | 0.30 | 19 | 12 | 543.0 | 0.019 |
| People management | 30 | 1.27 | 0.32 | 22.00 | 53 | 1.35 | 0.24 | 17 | -5 | 680.0 | 0.244 |
| <i>Interpersonal skill</i> | 31 | 1.52 | 0.21 | 6.00 | 53 | 1.38 | 0.28 | 13 | 7 | 607.5 | 0.030 |
| <i>Communication skill</i> | 31 | 1.57 | 0.20 | 2.00 | 53 | 1.44 | 0.21 | 5 | 3 | 540.0 | 0.003 |
| Rigour | 31 | 1.57 | 0.21 | 2.00 | 53 | 1.55 | 0.19 | 3 | 1 | 736.5 | 0.312 |
| Teamwork | 31 | 1.42 | 0.32 | 15.00 | 53 | 1.40 | 0.24 | 9 | -6 | 739.0 | 0.408 |
| Ethical conduct | 32 | 1.47 | 0.32 | 8.00 | 53 | 1.59 | 0.16 | 1 | -7 | 704.0 | 0.088 |
| Relationship management | 32 | 1.46 | 0.25 | 10.00 | 53 | 1.45 | 0.21 | 4 | -6 | 810.5 | 0.707 |
| Client quality | 31 | 1.42 | 0.30 | 15.00 | 53 | 1.30 | 0.30 | 20 | 5 | 631.5 | 0.063 |
| Networks | 31 | 1.43 | 0.31 | 13.00 | 53 | 1.35 | 0.26 | 17 | 4 | 666.5 | 0.125 |
| Brand | 31 | 1.26 | 0.33 | 23.00 | 53 | 1.25 | 0.28 | 23 | - | 819.5 | 0.984 |
| International reach | 31 | 1.15 | 0.45 | 26.00 | 53 | 1.06 | 0.42 | 26 | - | 712.5 | 0.300 |
| <i>Knowledge management</i> | 30 | 1.47 | 0.27 | 9.00 | 53 | 1.30 | 0.30 | 20 | 11 | 538.5 | 0.010 |
| Work methods | 30 | 1.42 | 0.28 | 14.00 | 53 | 1.40 | 0.25 | 11 | -3 | 731.5 | 0.513 |
| IT systems | 31 | 1.18 | 0.42 | 25.00 | 53 | 1.25 | 0.29 | 24 | -1 | 779.5 | 0.684 |
| Training | 30 | 1.38 | 0.36 | 18.00 | 53 | 1.43 | 0.22 | 7 | -11 | 783.5 | 0.905 |
| Innovation capture | 30 | 1.32 | 0.37 | 20.00 | 53 | 1.24 | 0.31 | 25 | 5 | 656.5 | 0.167 |
| Measurement ability | 31 | 1.45 | 0.32 | 11.00 | 53 | 1.42 | 0.28 | 8 | -3 | 726.0 | 0.332 |
| Estimating ability | 32 | 1.55 | 0.26 | 4.00 | 53 | 1.57 | 0.18 | 2 | -2 | 836.0 | 0.887 |
| <i>Cost control ability</i> | 31 | 1.58 | 0.17 | 1.00 | 53 | 1.44 | 0.26 | 5 | 4 | 554.0 | 0.005 |
| <i>Cost knowledge</i> | 31 | 1.53 | 0.22 | 5.00 | 53 | 1.40 | 0.27 | 11 | 6 | 596.0 | 0.022 |
| Construction knowledge | 31 | 1.45 | 0.35 | 11.00 | 53 | 1.38 | 0.30 | 13 | 2 | 673.0 | 0.134 |
| Legal knowledge | 31 | 1.41 | 0.31 | 17.00 | 53 | 1.36 | 0.27 | 16 | -1 | 725.0 | 0.337 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Table 99: Internal Factor Importance – Difference of Perception Between Consulting Quantity Surveyors and Others (Full Table)

| Internal Factor Importance | Consulting QS | | | | Non-Consulting QS | | | | rank var. | U | p |
|-------------------------------|---------------|-------------|-------------|--------------|-------------------|-------------|-------------|----------|------------|------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Leadership | 43 | 1.33 | 0.45 | 18.00 | 40 | 1.53 | 0.76 | 20 | 2 | 763 | 0.346 |
| Market awareness | 43 | 1.31 | 0.37 | 21.00 | 40 | 1.68 | 0.87 | 1 | -20 | 670 | 0.063 |
| Strategic management | 44 | 1.25 | 0.31 | 22.00 | 40 | 1.56 | 0.93 | 14 | -8 | 761 | 0.251 |
| Firm flexibility | 43 | 1.38 | 0.26 | 12.00 | 39 | 1.54 | 0.52 | 17 | 5 | 794 | 0.657 |
| People management | 43 | 1.35 | 0.25 | 16.00 | 40 | 1.47 | 0.67 | 25 | 9 | 780 | 0.433 |
| Interpersonal skill | 43 | 1.40 | 0.30 | 9.00 | 41 | 1.59 | 0.36 | 10 | 1 | 809 | 0.479 |
| Communication skill | 43 | 1.49 | 0.21 | 4.00 | 41 | 1.57 | 0.33 | 13 | 9 | 872 | 0.920 |
| Rigour | 43 | 1.53 | 0.21 | 2.00 | 41 | 1.64 | 0.36 | 6 | 4 | 789 | 0.285 |
| Teamwork | 43 | 1.40 | 0.29 | 9.00 | 41 | 1.54 | 0.38 | 18 | 9 | 880 | 0.985 |
| Ethical conduct | 44 | 1.52 | 0.25 | 3.00 | 41 | 1.65 | 0.35 | 3 | - | 787 | 0.185 |
| Relationship management | 44 | 1.43 | 0.24 | 7.00 | 41 | 1.59 | 0.32 | 11 | 4 | 823 | 0.440 |
| Client quality | 43 | 1.33 | 0.31 | 18.00 | 41 | 1.54 | 0.75 | 16 | -2 | 855 | 0.799 |
| Networks | 43 | 1.32 | 0.30 | 20.00 | 41 | 1.66 | 0.81 | 2 | -18 | 666 | 0.039 |
| Brand | 43 | 1.23 | 0.32 | 23.00 | 41 | 1.51 | 0.98 | 22 | -1 | 810 | 0.498 |
| International reach | 43 | 1.03 | 0.45 | 26.00 | 41 | 1.42 | 1.17 | 26 | - | 733 | 0.173 |
| Knowledge management | 43 | 1.36 | 0.31 | 14.00 | 40 | 1.52 | 0.58 | 21 | 7 | 839 | 0.836 |
| Work methods | 43 | 1.40 | 0.26 | 9.00 | 40 | 1.53 | 0.39 | 19 | 10 | 851 | 0.925 |
| IT systems | 44 | 1.20 | 0.39 | 24.00 | 40 | 1.50 | 1.04 | 23 | -1 | 850 | 0.775 |
| Training | 43 | 1.36 | 0.33 | 15.00 | 40 | 1.65 | 0.57 | 5 | -10 | 711 | 0.134 |
| Innovation capture | 43 | 1.19 | 0.37 | 25.00 | 40 | 1.61 | 1.07 | 8 | -17 | 634 | 0.030 |
| Measurement ability | 43 | 1.46 | 0.28 | 6.00 | 41 | 1.50 | 0.37 | 24 | 18 | 782 | 0.327 |
| Estimating ability | 44 | 1.56 | 0.24 | 1.00 | 41 | 1.62 | 0.39 | 7 | 6 | 881 | 0.809 |
| Cost control ability | 43 | 1.48 | 0.21 | 5.00 | 41 | 1.59 | 0.36 | 9 | 4 | 784 | 0.319 |
| Cost knowledge | 43 | 1.43 | 0.23 | 8.00 | 41 | 1.58 | 0.39 | 12 | 4 | 768 | 0.265 |
| Construction knowledge | 43 | 1.35 | 0.32 | 16.00 | 41 | 1.65 | 0.65 | 4 | -12 | 666 | 0.035 |
| Legal knowledge | 43 | 1.37 | 0.28 | 13.00 | 41 | 1.54 | 0.53 | 15 | 2 | 845 | 0.726 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Appendix H Internal Factor Performance – Original Observation

Table 100: Internal Factor Performance – Difference of Perception Between NZIQS and non-NZIQS Respondents (Full Table)

| Internal Factor Performance | NZIQS | | | | Non-NZIQS | | | | rank var. | U | p |
|-----------------------------|-------|------|------|-------|-----------|------|------|------|-----------|-----|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Leadership | 38 | 0.65 | 0.22 | 22.00 | 38 | 0.71 | 0.24 | 17 | -5 | 618 | 0.264 |
| Market awareness | 38 | 0.71 | 0.21 | 13.00 | 39 | 0.72 | 0.20 | 15 | 2 | 718 | 0.804 |
| Strategic management | 38 | 0.67 | 0.20 | 18.00 | 39 | 0.68 | 0.22 | 19 | 1 | 724 | 0.853 |
| Firm flexibility | 38 | 0.66 | 0.19 | 19.00 | 39 | 0.69 | 0.24 | 18 | -1 | 669 | 0.444 |
| People management | 38 | 0.57 | 0.25 | 25.00 | 38 | 0.65 | 0.23 | 23 | -2 | 594 | 0.170 |
| Interpersonal skill | 38 | 0.71 | 0.19 | 12.00 | 38 | 0.73 | 0.19 | 12 | - | 722 | 1.000 |
| Communication skill | 37 | 0.75 | 0.18 | 8.00 | 38 | 0.72 | 0.21 | 14 | 6 | 650 | 0.552 |
| Rigour | 37 | 0.82 | 0.21 | 2.00 | 37 | 0.80 | 0.18 | 2 | - | 630 | 0.532 |
| Teamwork | 38 | 0.75 | 0.20 | 7.00 | 38 | 0.75 | 0.23 | 8 | 1 | 716 | 0.948 |
| Ethical conduct | 39 | 0.87 | 0.17 | 1.00 | 38 | 0.77 | 0.23 | 5 | 4 | 552 | 0.039 |
| Relationship management | 40 | 0.78 | 0.18 | 3.00 | 38 | 0.81 | 0.16 | 1 | -2 | 701 | 0.527 |
| Client quality | 41 | 0.70 | 0.19 | 14.00 | 37 | 0.75 | 0.19 | 7 | -7 | 649 | 0.246 |
| Networks | 40 | 0.72 | 0.20 | 11.00 | 37 | 0.72 | 0.21 | 13 | 2 | 719 | 0.820 |
| Brand | 40 | 0.66 | 0.24 | 21.00 | 38 | 0.63 | 0.26 | 25 | 4 | 721 | 0.685 |
| International reach | 39 | 0.57 | 0.26 | 26.00 | 36 | 0.66 | 0.28 | 22 | -4 | 565 | 0.134 |
| Knowledge management | 38 | 0.69 | 0.24 | 15.00 | 38 | 0.66 | 0.24 | 21 | 6 | 695 | 0.767 |
| Work methods | 38 | 0.73 | 0.23 | 10.00 | 38 | 0.75 | 0.19 | 6 | -4 | 685 | 0.687 |
| IT systems | 38 | 0.66 | 0.21 | 20.00 | 37 | 0.64 | 0.25 | 24 | 4 | 703 | 0.996 |
| Training | 38 | 0.65 | 0.23 | 22.00 | 37 | 0.68 | 0.24 | 20 | -2 | 629 | 0.415 |
| Innovation capture | 39 | 0.63 | 0.22 | 24.00 | 37 | 0.59 | 0.29 | 26 | 2 | 686 | 0.701 |
| Measurement ability | 40 | 0.76 | 0.24 | 5.00 | 38 | 0.73 | 0.25 | 11 | 6 | 722 | 0.689 |
| Estimating ability | 40 | 0.77 | 0.22 | 4.00 | 38 | 0.79 | 0.24 | 3 | -1 | 698 | 0.515 |
| Cost control ability | 40 | 0.76 | 0.21 | 5.00 | 37 | 0.79 | 0.20 | 4 | -1 | 667 | 0.432 |
| Cost knowledge | 40 | 0.74 | 0.20 | 9.00 | 37 | 0.74 | 0.25 | 10 | 1 | 718 | 0.816 |
| Construction knowledge | 41 | 0.68 | 0.26 | 16.00 | 37 | 0.71 | 0.24 | 16 | - | 715 | 0.653 |
| Legal knowledge | 39 | 0.67 | 0.21 | 17.00 | 38 | 0.74 | 0.19 | 9 | -8 | 636 | 0.262 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Table 101: Internal Factor Performance – Difference of Perception Between Emerging and Highly Experienced Respondents (Full Table)

| Internal Factor Performance | Emerging Professionals | | | | Senior Professionals | | | | rank var. | U | p |
|-------------------------------|------------------------|-------------|-------------|--------------|----------------------|-------------|-------------|-----------|-----------|--------------|--------------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Leadership | 26 | 0.69 | 0.23 | 25.00 | 50 | 0.67 | 0.23 | 15 | -10 | 610.0 | 0.651 |
| Market awareness | 26 | 0.76 | 0.23 | 19.00 | 51 | 0.69 | 0.19 | 11 | -8 | 532.0 | 0.143 |
| Strategic management | 26 | 0.74 | 0.21 | 21.00 | 51 | 0.64 | 0.20 | 18 | -3 | 505.5 | 0.078 |
| Firm flexibility | 26 | 0.73 | 0.24 | 23.00 | 51 | 0.65 | 0.20 | 17 | -6 | 529.0 | 0.135 |
| People management | 26 | 0.65 | 0.25 | 26.00 | 50 | 0.59 | 0.24 | 23 | -3 | 559.5 | 0.307 |
| Interpersonal skill | 26 | 0.77 | 0.18 | 16.00 | 50 | 0.69 | 0.19 | 9 | -7 | 510.5 | 0.104 |
| Communication skill | 25 | 0.82 | 0.16 | 4.00 | 50 | 0.69 | 0.19 | 10 | 6 | 389.5 | 0.005 |
| Rigour | 25 | 0.86 | 0.19 | 2.00 | 49 | 0.78 | 0.20 | 2 | - | 474.0 | 0.093 |
| Teamwork | 26 | 0.79 | 0.22 | 13.00 | 50 | 0.73 | 0.21 | 6 | -7 | 532.5 | 0.179 |
| Ethical conduct | 27 | 0.80 | 0.25 | 10.00 | 50 | 0.84 | 0.18 | 1 | -9 | 661.0 | 0.873 |
| Relationship management | 27 | 0.82 | 0.16 | 5.00 | 51 | 0.77 | 0.17 | 3 | -2 | 584.0 | 0.243 |
| Client quality | 28 | 0.80 | 0.17 | 10.00 | 50 | 0.68 | 0.19 | 13 | 3 | 467.5 | 0.011 |
| Networks | 27 | 0.80 | 0.20 | 10.00 | 50 | 0.68 | 0.20 | 14 | 4 | 458.0 | 0.016 |
| Brand | 27 | 0.75 | 0.23 | 20.00 | 51 | 0.59 | 0.23 | 22 | 2 | 434.5 | 0.006 |
| International reach | 27 | 0.73 | 0.26 | 24.00 | 48 | 0.55 | 0.26 | 26 | 2 | 413.0 | 0.008 |
| Knowledge management | 26 | 0.78 | 0.22 | 15.00 | 50 | 0.62 | 0.23 | 20 | 5 | 417.5 | 0.008 |
| Work methods | 26 | 0.82 | 0.16 | 7.00 | 50 | 0.70 | 0.23 | 8 | 1 | 465.5 | 0.034 |
| IT systems | 25 | 0.77 | 0.20 | 17.00 | 50 | 0.59 | 0.22 | 23 | 6 | 363.0 | 0.002 |
| Training | 25 | 0.77 | 0.21 | 17.00 | 50 | 0.61 | 0.23 | 21 | 4 | 400.0 | 0.009 |
| Innovation capture | 26 | 0.74 | 0.24 | 21.00 | 50 | 0.55 | 0.24 | 25 | 4 | 381.5 | 0.003 |
| Measurement ability | 27 | 0.81 | 0.21 | 8.00 | 51 | 0.71 | 0.25 | 7 | -1 | 511.5 | 0.053 |
| Estimating ability | 27 | 0.86 | 0.18 | 1.00 | 51 | 0.74 | 0.24 | 5 | 4 | 484.0 | 0.024 |
| Cost control ability | 27 | 0.82 | 0.22 | 5.00 | 50 | 0.74 | 0.19 | 4 | -1 | 505.0 | 0.057 |
| Cost knowledge | 26 | 0.84 | 0.20 | 3.00 | 51 | 0.69 | 0.22 | 11 | 8 | 409.0 | 0.004 |
| Construction knowledge | 28 | 0.81 | 0.24 | 9.00 | 50 | 0.64 | 0.23 | 19 | 10 | 428.0 | 0.003 |
| Legal knowledge | 27 | 0.78 | 0.19 | 14.00 | 50 | 0.66 | 0.20 | 16 | 2 | 457.0 | 0.015 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Table 102: Internal Factor Performance – Difference of Perception Between Consulting Quantity Surveyors and Others (Full Table)

| Internal Factor Performance | Consulting QS | | | | Non-Consulting QS | | | | rank var. | U | p |
|-----------------------------|---------------|------|------|-------|-------------------|------|------|------|-----------|-----|-------|
| | n | mean | s.d. | rank | n | mean | s.d. | rank | | | |
| Leadership | 40 | 0.69 | 0.21 | 16.00 | 36 | 0.79 | 0.46 | 19 | 3 | 697 | 0.800 |
| Market awareness | 40 | 0.72 | 0.19 | 14.00 | 37 | 0.81 | 0.39 | 13 | -1 | 740 | 1.000 |
| Strategic management | 40 | 0.67 | 0.21 | 19.00 | 37 | 0.81 | 0.52 | 14 | -5 | 706 | 0.719 |
| Firm flexibility | 40 | 0.68 | 0.21 | 18.00 | 37 | 0.81 | 0.49 | 16 | -2 | 708 | 0.735 |
| People management | 39 | 0.63 | 0.23 | 24.00 | 37 | 0.75 | 0.69 | 25 | 1 | 685 | 0.696 |
| Interpersonal skill | 39 | 0.70 | 0.20 | 15.00 | 37 | 0.85 | 0.39 | 3 | -12 | 653 | 0.449 |
| Communication skill | 38 | 0.73 | 0.19 | 9.00 | 37 | 0.81 | 0.27 | 11 | 2 | 697 | 0.946 |
| Rigour | 39 | 0.80 | 0.17 | 2.00 | 35 | 0.86 | 0.27 | 2 | - | 607 | 0.382 |
| Teamwork | 39 | 0.74 | 0.21 | 8.00 | 37 | 0.83 | 0.27 | 9 | 1 | 686 | 0.700 |
| Ethical conduct | 40 | 0.84 | 0.21 | 1.00 | 37 | 0.85 | 0.27 | 5 | 4 | 671 | 0.451 |
| Relationship management | 40 | 0.79 | 0.17 | 3.00 | 38 | 0.84 | 0.21 | 8 | 5 | 756 | 0.962 |
| Client quality | 40 | 0.73 | 0.19 | 10.00 | 38 | 0.81 | 0.28 | 15 | 5 | 750 | 0.916 |
| Networks | 40 | 0.72 | 0.19 | 11.00 | 37 | 0.81 | 0.32 | 12 | 1 | 714 | 0.779 |
| Brand | 40 | 0.66 | 0.24 | 21.00 | 38 | 0.77 | 0.59 | 23 | 2 | 700 | 0.538 |
| International reach | 38 | 0.62 | 0.27 | 25.00 | 37 | 0.76 | 0.72 | 24 | -1 | 691 | 0.896 |
| Knowledge management | 39 | 0.72 | 0.19 | 12.00 | 37 | 0.73 | 0.38 | 26 | 14 | 620 | 0.271 |
| Work methods | 39 | 0.76 | 0.18 | 6.00 | 37 | 0.78 | 0.27 | 21 | 15 | 693 | 0.752 |
| IT systems | 38 | 0.66 | 0.22 | 23.00 | 37 | 0.79 | 0.65 | 18 | -5 | 682 | 0.812 |
| Training | 38 | 0.66 | 0.21 | 20.00 | 37 | 0.80 | 0.57 | 17 | -3 | 697 | 0.948 |
| Innovation capture | 39 | 0.62 | 0.24 | 26.00 | 37 | 0.78 | 0.75 | 22 | -4 | 721 | 0.991 |
| Measurement ability | 40 | 0.76 | 0.22 | 5.00 | 38 | 0.78 | 0.28 | 20 | 15 | 722 | 0.689 |
| Estimating ability | 40 | 0.79 | 0.21 | 3.00 | 38 | 0.82 | 0.27 | 10 | 7 | 754 | 0.950 |
| Cost control ability | 39 | 0.76 | 0.21 | 6.00 | 38 | 0.85 | 0.23 | 7 | 1 | 698 | 0.646 |
| Cost knowledge | 39 | 0.72 | 0.20 | 12.00 | 38 | 0.85 | 0.35 | 4 | -8 | 632 | 0.246 |
| Construction knowledge | 41 | 0.66 | 0.24 | 22.00 | 37 | 0.89 | 0.61 | 1 | -21 | 612 | 0.128 |
| Legal knowledge | 39 | 0.68 | 0.18 | 17.00 | 38 | 0.85 | 0.46 | 6 | -11 | 607 | 0.151 |

U = Mann-Whitney U
p = 2-tailed Asymptotic Significance (p-value)

Appendix I Original Observation – External Factor Impact and Internal Factor Importance Correlations (Matching Percentage), Rank Ordered

Table 103: External-Internal Factor Pair Correlations (alpha = 0.050)

| External Factor | Internal Factor | Correl. Coeff. | Sig. (2-tailed) | Rank | n |
|------------------------------|------------------------|----------------|-----------------|------|----|
| Qualifications | Training | 0.467 | 0.000 | 1 | 86 |
| International demand | Innovation capture | 0.427 | 0.000 | 2 | 78 |
| Qualifications | Networks | 0.422 | 0.000 | 3 | 86 |
| Private sector | Strategic management | 0.395 | 0.000 | 4 | 87 |
| Public sector | Cost knowledge | 0.393 | 0.000 | 5 | 87 |
| Qualifications | Innovation capture | 0.389 | 0.000 | 6 | 85 |
| Supply chain position | Training | 0.388 | 0.000 | 7 | 87 |
| IT substitutions | Work methods | 0.385 | 0.000 | 8 | 89 |
| Supply chain position | Interpersonal skill | 0.380 | 0.000 | 9 | 88 |
| Supply chain position | Networks | 0.375 | 0.000 | 10 | 87 |
| IT substitutions | Innovation capture | 0.372 | 0.000 | 11 | 88 |
| In-house QS | Firm flexibility | 0.372 | 0.000 | 12 | 88 |
| Private sector | Market awareness | 0.371 | 0.000 | 13 | 87 |
| Supply chain position | Legal knowledge | 0.361 | 0.001 | 14 | 88 |
| Contractor demand | Legal knowledge | 0.354 | 0.001 | 15 | 88 |
| IT substitutions | IT systems | 0.353 | 0.001 | 16 | 89 |
| Public sector | Market awareness | 0.351 | 0.001 | 17 | 86 |
| Supply chain position | Innovation capture | 0.348 | 0.001 | 18 | 86 |
| International demand | Cost control ability | 0.346 | 0.002 | 19 | 79 |
| Employment market | Training | 0.345 | 0.001 | 20 | 86 |
| In-house QS | Construction knowledge | 0.344 | 0.001 | 21 | 90 |
| Associated professions | Cost knowledge | 0.341 | 0.001 | 22 | 90 |
| International demand | Legal knowledge | 0.340 | 0.002 | 23 | 80 |
| Industry cycles | Market awareness | 0.340 | 0.001 | 24 | 88 |
| International demand | Training | 0.335 | 0.003 | 25 | 79 |
| Public sector | IT systems | 0.335 | 0.002 | 26 | 86 |
| Employment market | Networks | 0.334 | 0.002 | 27 | 86 |
| Associated professionals | Legal knowledge | 0.332 | 0.002 | 28 | 89 |
| Price competition | Networks | 0.330 | 0.002 | 29 | 87 |
| Employment market | Firm flexibility | 0.326 | 0.002 | 30 | 86 |
| Supply chain position | IT systems | 0.323 | 0.002 | 31 | 87 |
| Private sector | Cost knowledge | 0.316 | 0.003 | 32 | 88 |
| IT advances | Innovation capture | 0.316 | 0.003 | 33 | 85 |
| Price competition | Knowledge management | 0.309 | 0.004 | 34 | 87 |
| IT substitutions | Brand | 0.309 | 0.003 | 35 | 90 |
| Associated professionals | Cost control ability | 0.307 | 0.004 | 36 | 88 |
| Public sector | Interpersonal skill | 0.304 | 0.004 | 37 | 87 |
| IT substitutions | International reach | 0.303 | 0.004 | 38 | 90 |
| Supply chain position | Cost knowledge | 0.301 | 0.004 | 39 | 88 |
| Professional collaboration | Brand | 0.301 | 0.005 | 40 | 86 |
| Contractor demand | IT systems | 0.299 | 0.005 | 41 | 88 |
| Non-construction professions | Legal knowledge | 0.298 | 0.004 | 42 | 90 |
| Private sector | Legal knowledge | 0.297 | 0.005 | 43 | 88 |
| Associated professionals | Strategic management | 0.293 | 0.006 | 44 | 88 |
| Public sector | Communication skill | 0.290 | 0.007 | 45 | 87 |

| | | | | | |
|------------------------------|------------------------|-------|-------|----|----|
| Qualifications | International reach | 0.289 | 0.007 | 46 | 87 |
| Supply chain position | Communication skill | 0.288 | 0.006 | 47 | 88 |
| Barriers to entry | Firm flexibility | 0.287 | 0.007 | 48 | 87 |
| Public sector | Training | 0.285 | 0.008 | 49 | 86 |
| Non-construction professions | Cost control ability | 0.284 | 0.007 | 50 | 89 |
| Contractor demand | Cost knowledge | 0.284 | 0.007 | 51 | 88 |
| Barriers to entry | Measurement ability | 0.283 | 0.007 | 52 | 89 |
| Non-construction professions | Strategic management | 0.283 | 0.007 | 53 | 89 |
| IT substitutions | Training | 0.281 | 0.008 | 54 | 89 |
| Professional collaboration | IT systems | 0.278 | 0.010 | 55 | 85 |
| Private sector | Training | 0.278 | 0.009 | 56 | 87 |
| Public cost data | International reach | 0.275 | 0.009 | 57 | 89 |
| Public sector | Construction knowledge | 0.275 | 0.010 | 58 | 87 |
| IT substitutions | Client quality | 0.273 | 0.009 | 59 | 90 |
| Supply chain position | Construction knowledge | 0.273 | 0.010 | 60 | 88 |
| Industry cycles | Training | 0.271 | 0.011 | 61 | 88 |
| Non-construction professions | Estimating ability | 0.270 | 0.010 | 62 | 90 |
| IT substitutions | Networks | 0.269 | 0.011 | 63 | 89 |
| Institute CPD | Legal knowledge | 0.269 | 0.011 | 64 | 88 |
| Public sector | Work methods | 0.266 | 0.013 | 65 | 86 |
| Qualifications | IT systems | 0.266 | 0.013 | 66 | 86 |
| Supply chain position | Work methods | 0.265 | 0.013 | 67 | 87 |
| Associated professionals | Cost knowledge | 0.265 | 0.012 | 68 | 89 |
| In-house QS | Communication skill | 0.264 | 0.012 | 69 | 90 |
| IT advances | Knowledge management | 0.264 | 0.014 | 70 | 86 |
| Professional collaboration | Networks | 0.263 | 0.014 | 71 | 86 |
| Supply chain position | Ethical conduct | 0.263 | 0.013 | 72 | 88 |
| Associated professionals | Market awareness | 0.262 | 0.014 | 73 | 88 |
| Contractor demand | Construction knowledge | 0.262 | 0.014 | 74 | 88 |
| Barriers to entry | Cost knowledge | 0.261 | 0.013 | 75 | 89 |
| Private sector | Innovation capture | 0.261 | 0.015 | 76 | 86 |
| IT advances | Client quality | 0.259 | 0.016 | 77 | 87 |
| Employment market | Innovation capture | 0.258 | 0.017 | 78 | 85 |
| Supply chain position | Cost control ability | 0.257 | 0.016 | 79 | 87 |
| In-house QS | Cost control ability | 0.257 | 0.015 | 80 | 89 |
| Private sector | Construction knowledge | 0.257 | 0.016 | 81 | 88 |
| Barriers to entry | Strategic management | 0.256 | 0.016 | 82 | 88 |
| IT advances | International reach | 0.256 | 0.017 | 83 | 87 |
| Public sector | Strategic management | 0.253 | 0.019 | 84 | 86 |
| Private sector | Teamwork | 0.252 | 0.018 | 85 | 88 |
| Price competition | Brand | 0.252 | 0.018 | 86 | 88 |
| Public sector | Legal knowledge | 0.250 | 0.020 | 87 | 87 |
| Supply chain position | Market awareness | 0.249 | 0.020 | 88 | 87 |
| IT substitutions | People management | 0.248 | 0.020 | 89 | 88 |
| Qualifications | Legal knowledge | 0.246 | 0.021 | 90 | 87 |
| Private sector | Ethical conduct | 0.245 | 0.022 | 91 | 88 |
| IT substitutions | Market awareness | 0.243 | 0.022 | 92 | 89 |
| IT substitutions | Knowledge management | 0.242 | 0.022 | 93 | 89 |

| | | | | | |
|------------------------------|------------------------|-------|-------|-----|----|
| Price competition | Client quality | 0.241 | 0.024 | 94 | 88 |
| International demand | Networks | 0.240 | 0.033 | 95 | 79 |
| Associated professionals | Construction knowledge | 0.240 | 0.024 | 96 | 89 |
| Barriers to entry | Estimating ability | 0.239 | 0.024 | 97 | 89 |
| IT advances | Networks | 0.239 | 0.027 | 98 | 86 |
| Profession lifecycle | Cost control ability | 0.239 | 0.029 | 99 | 84 |
| Institute CPD | Training | 0.237 | 0.027 | 100 | 87 |
| Associated professions | Legal knowledge | 0.236 | 0.025 | 101 | 90 |
| Industry cycles | Leadership | 0.236 | 0.027 | 102 | 88 |
| International demand | Ethical conduct | 0.236 | 0.035 | 103 | 80 |
| Private sector | Work methods | 0.234 | 0.029 | 104 | 87 |
| Environmental services | Knowledge management | 0.234 | 0.030 | 105 | 86 |
| Environmental services | Innovation capture | 0.232 | 0.033 | 106 | 85 |
| Qualifications | Cost control ability | 0.229 | 0.034 | 107 | 86 |
| International demand | Construction knowledge | 0.228 | 0.042 | 108 | 80 |
| Employment market | Interpersonal skill | 0.226 | 0.035 | 109 | 87 |
| In-house QS | Measurement ability | 0.226 | 0.032 | 110 | 90 |
| Public sector | Teamwork | 0.226 | 0.036 | 111 | 87 |
| Qualifications | Client quality | 0.225 | 0.036 | 112 | 87 |
| Barriers to entry | Cost control ability | 0.225 | 0.035 | 113 | 88 |
| Environmental services | Client quality | 0.224 | 0.037 | 114 | 87 |
| Non-construction professions | Innovation capture | 0.224 | 0.036 | 115 | 88 |
| Professional collaboration | Client quality | 0.223 | 0.039 | 116 | 86 |
| In-house QS | Training | 0.223 | 0.036 | 117 | 89 |
| Industry cycles | Firm flexibility | 0.223 | 0.038 | 118 | 87 |
| IT advances | Brand | 0.220 | 0.040 | 119 | 87 |
| Associated professions | Estimating ability | 0.220 | 0.036 | 120 | 91 |
| Associated professions | Construction knowledge | 0.218 | 0.039 | 121 | 90 |
| Supply chain position | Estimating ability | 0.217 | 0.042 | 122 | 88 |
| Supply chain position | Strategic management | 0.217 | 0.044 | 123 | 87 |
| Qualifications | Brand | 0.215 | 0.046 | 124 | 87 |
| Non-construction professions | Rigour | 0.214 | 0.043 | 125 | 90 |
| Associated professionals | IT systems | 0.214 | 0.045 | 126 | 88 |
| Associated professionals | Interpersonal skill | 0.214 | 0.044 | 127 | 89 |
| Non-construction professions | Construction knowledge | 0.214 | 0.043 | 128 | 90 |
| Other industries | Legal knowledge | 0.214 | 0.047 | 129 | 87 |

Appendix J Tests of Normality – Descriptive Research, Follow-up Observation Data

Table 104: Normality Check: External Factor Polarised Impact Data

| External Force | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|------------------------------|---------------------------------|-----|------|--------------|-----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Associated professions | 0.187 | 133 | 0.00 | 0.917 | 133 | 0.00 |
| Non-construction professions | 0.147 | 129 | 0.00 | 0.951 | 129 | 0.00 |
| Non-building | 0.161 | 131 | 0.00 | 0.903 | 131 | 0.00 |
| Other industries | 0.180 | 128 | 0.00 | 0.917 | 128 | 0.00 |
| Environmental services | 0.161 | 128 | 0.00 | 0.919 | 128 | 0.00 |
| Barriers to entry | 0.132 | 126 | 0.00 | 0.953 | 126 | 0.00 |
| IT substitutions | 0.173 | 133 | 0.00 | 0.882 | 133 | 0.00 |
| Non-traditional procurement | 0.224 | 131 | 0.00 | 0.928 | 131 | 0.00 |
| Lead consultants | 0.239 | 133 | 0.00 | 0.881 | 133 | 0.00 |
| In-house QS | 0.203 | 132 | 0.00 | 0.914 | 132 | 0.00 |
| Public cost data | 0.248 | 130 | 0.00 | 0.903 | 130 | 0.00 |
| Qualifications | 0.166 | 128 | 0.00 | 0.930 | 128 | 0.00 |
| Employment market | 0.181 | 132 | 0.00 | 0.916 | 132 | 0.00 |
| IT advances | 0.242 | 130 | 0.00 | 0.844 | 130 | 0.00 |
| Upstream information | 0.162 | 129 | 0.00 | 0.901 | 129 | 0.00 |
| Industry cycles | 0.212 | 128 | 0.00 | 0.928 | 128 | 0.00 |
| Private sector | 0.228 | 130 | 0.00 | 0.891 | 130 | 0.00 |
| Public sector | 0.213 | 129 | 0.00 | 0.796 | 129 | 0.00 |
| Associated professionals | 0.219 | 128 | 0.00 | 0.857 | 128 | 0.00 |
| Contractor demand | 0.201 | 131 | 0.00 | 0.891 | 131 | 0.00 |
| Supply chain position | 0.209 | 127 | 0.00 | 0.903 | 127 | 0.00 |
| International demand | 0.183 | 123 | 0.00 | 0.899 | 123 | 0.00 |
| Institute CPD | 0.216 | 130 | 0.00 | 0.911 | 130 | 0.00 |
| Institute profile | 0.243 | 127 | 0.00 | 0.908 | 127 | 0.00 |
| Professional collaboration | 0.211 | 124 | 0.00 | 0.930 | 124 | 0.00 |
| Price competition | 0.195 | 128 | 0.00 | 0.870 | 128 | 0.00 |
| Large firms | 0.198 | 129 | 0.00 | 0.932 | 129 | 0.00 |
| Profession lifecycle | 0.168 | 117 | 0.00 | 0.937 | 117 | 0.00 |

a. Lilliefors Significance Correction

Table 105: Normality Check: Internal Factor Importance Data

| Internal Factor | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|-------------------------|---------------------------------|-----|------|--------------|-----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership | 0.346 | 112 | 0.00 | 0.718 | 112 | 0.00 |
| Market awareness | 0.243 | 114 | 0.00 | 0.818 | 114 | 0.00 |
| Strategic management | 0.257 | 113 | 0.00 | 0.864 | 113 | 0.00 |
| Firm flexibility | 0.195 | 115 | 0.00 | 0.868 | 115 | 0.00 |
| People management | 0.204 | 115 | 0.00 | 0.861 | 115 | 0.00 |
| Interpersonal skill | 0.227 | 118 | 0.00 | 0.829 | 118 | 0.00 |
| Communication skill | 0.270 | 117 | 0.00 | 0.797 | 117 | 0.00 |
| Rigour | 0.376 | 117 | 0.00 | 0.690 | 117 | 0.00 |
| Teamwork | 0.243 | 117 | 0.00 | 0.824 | 117 | 0.00 |
| Ethical conduct | 0.396 | 116 | 0.00 | 0.652 | 116 | 0.00 |
| Relationship management | 0.322 | 117 | 0.00 | 0.752 | 117 | 0.00 |
| Client quality | 0.234 | 116 | 0.00 | 0.836 | 116 | 0.00 |
| Networks | 0.216 | 116 | 0.00 | 0.846 | 116 | 0.00 |
| Brand | 0.199 | 115 | 0.00 | 0.900 | 115 | 0.00 |
| International reach | 0.217 | 115 | 0.00 | 0.920 | 115 | 0.00 |
| Knowledge management | 0.229 | 116 | 0.00 | 0.847 | 116 | 0.00 |
| Work methods | 0.245 | 117 | 0.00 | 0.807 | 117 | 0.00 |
| IT systems | 0.189 | 116 | 0.00 | 0.886 | 116 | 0.00 |
| Training | 0.258 | 117 | 0.00 | 0.814 | 117 | 0.00 |
| Innovation capture | 0.192 | 115 | 0.00 | 0.879 | 115 | 0.00 |
| Measurement ability | 0.276 | 117 | 0.00 | 0.713 | 117 | 0.00 |
| Estimating ability | 0.358 | 117 | 0.00 | 0.652 | 117 | 0.00 |
| Cost control ability | 0.249 | 115 | 0.00 | 0.797 | 115 | 0.00 |
| Cost knowledge | 0.291 | 117 | 0.00 | 0.778 | 117 | 0.00 |
| Construction knowledge | 0.234 | 117 | 0.00 | 0.809 | 117 | 0.00 |
| Legal knowledge | 0.244 | 116 | 0.00 | 0.817 | 116 | 0.00 |

a. Lilliefors Significance Correction

Table 106: Normality Check: Internal Factor Performance Data

| Internal Factor | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|-------------------------|---------------------------------|-----|------|--------------|-----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership | 0.197 | 104 | 0.00 | 0.901 | 104 | 0.00 |
| Market awareness | 0.234 | 101 | 0.00 | 0.884 | 101 | 0.00 |
| Strategic management | 0.179 | 104 | 0.00 | 0.914 | 104 | 0.00 |
| Firm flexibility | 0.157 | 102 | 0.00 | 0.929 | 102 | 0.00 |
| People management | 0.163 | 105 | 0.00 | 0.914 | 105 | 0.00 |
| Interpersonal skill | 0.179 | 107 | 0.00 | 0.904 | 107 | 0.00 |
| Communication skill | 0.196 | 106 | 0.00 | 0.898 | 106 | 0.00 |
| Rigour | 0.208 | 105 | 0.00 | 0.871 | 105 | 0.00 |
| Teamwork | 0.205 | 105 | 0.00 | 0.903 | 105 | 0.00 |
| Ethical conduct | 0.218 | 104 | 0.00 | 0.871 | 104 | 0.00 |
| Relationship management | 0.197 | 101 | 0.00 | 0.888 | 101 | 0.00 |
| Client quality | 0.226 | 101 | 0.00 | 0.889 | 101 | 0.00 |
| Networks | 0.215 | 103 | 0.00 | 0.889 | 103 | 0.00 |
| Brand | 0.158 | 102 | 0.00 | 0.925 | 102 | 0.00 |
| International reach | 0.184 | 99 | 0.00 | 0.933 | 99 | 0.00 |
| Knowledge management | 0.191 | 99 | 0.00 | 0.898 | 99 | 0.00 |
| Work methods | 0.237 | 100 | 0.00 | 0.893 | 100 | 0.00 |
| IT systems | 0.177 | 103 | 0.00 | 0.926 | 103 | 0.00 |
| Training | 0.163 | 102 | 0.00 | 0.925 | 102 | 0.00 |
| Innovation capture | 0.152 | 99 | 0.00 | 0.928 | 99 | 0.00 |
| Measurement ability | 0.251 | 105 | 0.00 | 0.849 | 105 | 0.00 |
| Estimating ability | 0.271 | 104 | 0.00 | 0.859 | 104 | 0.00 |
| Cost control ability | 0.233 | 104 | 0.00 | 0.884 | 104 | 0.00 |
| Cost knowledge | 0.215 | 103 | 0.00 | 0.883 | 103 | 0.00 |
| Construction knowledge | 0.162 | 106 | 0.00 | 0.904 | 106 | 0.00 |
| Legal knowledge | 0.193 | 104 | 0.00 | 0.903 | 104 | 0.00 |

a. Lilliefors Significance Correction

Appendix K Follow-up Observation – External Factor Impact and Internal Factor Importance Correlations (Matching Percentage), Rank Ordered

Table 107: External-Internal Factor Pair Correlations (alpha = 0.050)

| External Factor | Internal Factor | Correlation Coefficient | Sig. (2-tailed) | Rank | No. of observations |
|-----------------------------|------------------------|-------------------------|-----------------|------|---------------------|
| International demand | International reach | 0.409 | 0.000 | 1 | 106 |
| International demand | Cost knowledge | 0.368 | 0.000 | 2 | 106 |
| IT substitutions | Innovation capture | 0.340 | 0.000 | 3 | 112 |
| Associated professionals | Cost knowledge | 0.337 | 0.000 | 4 | 109 |
| Private sector | Work methods | 0.329 | 0.000 | 6 | 113 |
| Supply chain position | Strategic management | 0.335 | 0.000 | 5 | 107 |
| Institute CPD | Training | 0.326 | 0.000 | 7 | 113 |
| Employment market | People management | 0.309 | 0.001 | 9 | 113 |
| Contractor demand | Work methods | 0.309 | 0.001 | 8 | 112 |
| IT substitutions | Training | 0.305 | 0.001 | 10 | 114 |
| IT advances | Innovation capture | 0.304 | 0.001 | 11 | 112 |
| Employment market | Training | 0.295 | 0.001 | 16 | 114 |
| Non-traditional procurement | IT systems | 0.298 | 0.001 | 15 | 112 |
| Associated professionals | Construction knowledge | 0.301 | 0.001 | 12 | 109 |
| Non-traditional procurement | Ethical conduct | 0.294 | 0.002 | 18 | 112 |
| Supply chain position | Work methods | 0.295 | 0.002 | 17 | 110 |
| Barriers to entry | Leadership | 0.300 | 0.002 | 13 | 106 |
| Barriers to entry | Leadership | 0.300 | 0.002 | 13 | 106 |
| Large firms | Estimating ability | 0.290 | 0.002 | 20 | 112 |
| Public cost data | IT systems | 0.289 | 0.002 | 21 | 112 |
| Private sector | Leadership | 0.293 | 0.002 | 19 | 107 |
| Private sector | Innovation capture | 0.287 | 0.002 | 22 | 111 |
| Private sector | Training | 0.282 | 0.003 | 27 | 113 |
| Private sector | Cost control ability | 0.282 | 0.003 | 26 | 111 |
| Qualifications | Training | 0.281 | 0.003 | 28 | 111 |
| International demand | Training | 0.287 | 0.003 | 23 | 106 |
| Lead consultants | Market awareness | 0.280 | 0.003 | 29 | 109 |
| International demand | Brand | 0.283 | 0.003 | 25 | 105 |
| Non-traditional procurement | Training | 0.273 | 0.003 | 31 | 113 |
| Profession lifecycle | Strategic management | 0.285 | 0.004 | 24 | 100 |
| Price competition | Strategic management | 0.275 | 0.004 | 30 | 108 |
| Lead consultants | People management | 0.267 | 0.005 | 33 | 110 |
| IT substitutions | IT systems | 0.262 | 0.005 | 34 | 113 |
| Qualifications | Strategic management | 0.268 | 0.005 | 32 | 107 |
| Public sector | Training | 0.260 | 0.005 | 35 | 113 |
| Non-building | Knowledge management | 0.258 | 0.006 | 36 | 111 |
| IT advances | Training | 0.253 | 0.007 | 40 | 114 |
| Large firms | Cost knowledge | 0.253 | 0.007 | 41 | 112 |
| Institute profile | Client quality | 0.254 | 0.007 | 38 | 111 |
| Public sector | Work methods | 0.247 | 0.008 | 45 | 113 |
| Qualifications | Firm flexibility | 0.251 | 0.009 | 42 | 109 |
| Associated professionals | Work methods | 0.250 | 0.009 | 43 | 109 |
| In-house QS | People management | 0.245 | 0.009 | 46 | 112 |
| Profession lifecycle | Training | 0.255 | 0.010 | 37 | 102 |
| Private sector | Knowledge management | 0.242 | 0.010 | 47 | 111 |

| | | | | | |
|-----------------------------|------------------------|-------|-------|----|-----|
| Supply chain position | Leadership | 0.247 | 0.011 | 44 | 104 |
| Public sector | People management | 0.239 | 0.012 | 51 | 111 |
| In-house QS | Market awareness | 0.239 | 0.012 | 52 | 111 |
| Profession lifecycle | Leadership | 0.254 | 0.012 | 39 | 98 |
| Large firms | Interpersonal skill | 0.236 | 0.012 | 55 | 112 |
| Institute profile | Brand | 0.237 | 0.012 | 54 | 111 |
| Public sector | Leadership | 0.241 | 0.013 | 48 | 107 |
| Supply chain position | Innovation capture | 0.239 | 0.013 | 50 | 108 |
| International demand | Work methods | 0.240 | 0.013 | 49 | 106 |
| Private sector | Strategic management | 0.237 | 0.013 | 53 | 109 |
| Institute profile | Networks | 0.234 | 0.014 | 56 | 110 |
| Supply chain position | Training | 0.234 | 0.014 | 57 | 110 |
| Professional collaboration | Innovation capture | 0.234 | 0.015 | 58 | 108 |
| Contractor demand | Cost knowledge | 0.230 | 0.015 | 63 | 112 |
| In-house QS | Brand | 0.229 | 0.015 | 64 | 112 |
| Large firms | Construction knowledge | 0.228 | 0.015 | 67 | 112 |
| Barriers to entry | People management | 0.231 | 0.016 | 60 | 109 |
| Barriers to entry | People management | 0.231 | 0.016 | 60 | 109 |
| Supply chain position | Market awareness | 0.233 | 0.016 | 59 | 107 |
| Contractor demand | Client quality | 0.228 | 0.016 | 68 | 111 |
| Lead consultants | Training | 0.226 | 0.016 | 70 | 112 |
| Large firms | Measurement ability | 0.227 | 0.017 | 69 | 111 |
| Institute CPD | Market awareness | 0.225 | 0.017 | 73 | 112 |
| Supply chain position | Brand | 0.228 | 0.017 | 66 | 108 |
| Non-building | People management | 0.225 | 0.018 | 72 | 111 |
| International demand | Measurement ability | 0.230 | 0.018 | 62 | 105 |
| Non-building | Work methods | 0.222 | 0.018 | 77 | 113 |
| Qualifications | Innovation capture | 0.223 | 0.019 | 74 | 110 |
| Institute CPD | Legal knowledge | 0.219 | 0.020 | 78 | 113 |
| Industry cycles | Strategic management | 0.226 | 0.020 | 71 | 106 |
| Profession lifecycle | Teamwork | 0.229 | 0.021 | 65 | 102 |
| Associated professionals | Measurement ability | 0.222 | 0.021 | 75 | 108 |
| Lead consultants | Ethical conduct | 0.219 | 0.021 | 80 | 111 |
| IT advances | Knowledge management | 0.217 | 0.022 | 82 | 112 |
| Contractor demand | Brand | 0.218 | 0.022 | 81 | 110 |
| Lead consultants | Leadership | 0.222 | 0.022 | 76 | 106 |
| Associated professions | Training | 0.213 | 0.023 | 85 | 114 |
| Associated professionals | Market awareness | 0.219 | 0.024 | 79 | 106 |
| Lead consultants | Communication skill | 0.213 | 0.024 | 84 | 112 |
| Non-building | Strategic management | 0.213 | 0.025 | 83 | 110 |
| IT advances | People management | 0.211 | 0.025 | 86 | 112 |
| IT advances | International reach | 0.208 | 0.028 | 88 | 112 |
| Contractor demand | Construction knowledge | 0.206 | 0.029 | 90 | 112 |
| IT advances | IT systems | 0.204 | 0.030 | 94 | 113 |
| Non-traditional procurement | Brand | 0.205 | 0.031 | 91 | 111 |
| In-house QS | Strategic management | 0.204 | 0.032 | 93 | 110 |
| Institute profile | Measurement ability | 0.203 | 0.032 | 96 | 111 |
| Non-traditional procurement | Estimating ability | 0.201 | 0.032 | 98 | 113 |

| | | | | | |
|-----------------------------|-------------------------|-------|-------|-----|-----|
| IT substitutions | Leadership | 0.205 | 0.032 | 92 | 109 |
| International demand | Knowledge management | 0.209 | 0.034 | 87 | 104 |
| Price competition | Innovation capture | 0.203 | 0.034 | 97 | 110 |
| Upstream information | Communication skill | 0.201 | 0.034 | 103 | 112 |
| Contractor demand | Market awareness | 0.203 | 0.034 | 95 | 109 |
| Public cost data | International reach | 0.201 | 0.034 | 101 | 111 |
| Contractor demand | Legal knowledge | 0.201 | 0.035 | 102 | 111 |
| Associated professions | People management | 0.200 | 0.035 | 105 | 112 |
| Institute profile | Innovation capture | 0.201 | 0.036 | 104 | 110 |
| Profession lifecycle | Interpersonal skill | 0.207 | 0.037 | 89 | 102 |
| Upstream information | People management | 0.199 | 0.037 | 106 | 110 |
| Large firms | Communication skill | 0.196 | 0.038 | 110 | 112 |
| Institute profile | IT systems | 0.198 | 0.038 | 107 | 110 |
| International demand | Estimating ability | 0.201 | 0.038 | 99 | 106 |
| Professional collaboration | Strategic management | 0.201 | 0.039 | 100 | 106 |
| Public sector | Legal knowledge | 0.196 | 0.039 | 111 | 112 |
| Employment market | Strategic management | 0.197 | 0.039 | 108 | 110 |
| Large firms | People management | 0.197 | 0.039 | 109 | 110 |
| Private sector | Rigour | 0.194 | 0.040 | 116 | 113 |
| In-house QS | Interpersonal skill | 0.192 | 0.040 | 118 | 114 |
| IT substitutions | Ethical conduct | 0.192 | 0.042 | 121 | 113 |
| Non-traditional procurement | Innovation capture | 0.194 | 0.042 | 115 | 111 |
| Public cost data | Innovation capture | 0.193 | 0.042 | 117 | 111 |
| In-house QS | Client quality | 0.192 | 0.042 | 124 | 113 |
| In-house QS | Relationship management | 0.192 | 0.042 | 125 | 113 |
| Industry cycles | Firm flexibility | 0.195 | 0.043 | 112 | 108 |
| Public sector | Ethical conduct | 0.192 | 0.043 | 123 | 112 |
| Upstream information | Innovation capture | 0.192 | 0.043 | 119 | 111 |
| Associated professionals | Estimating ability | 0.194 | 0.043 | 114 | 109 |
| Contractor demand | Networks | 0.192 | 0.043 | 120 | 111 |
| Upstream information | Relationship management | 0.191 | 0.044 | 126 | 112 |
| Institute CPD | IT systems | 0.190 | 0.045 | 129 | 112 |
| Large firms | Market awareness | 0.192 | 0.046 | 122 | 109 |
| Non-traditional procurement | Cost knowledge | 0.187 | 0.047 | 133 | 113 |
| International demand | People management | 0.195 | 0.048 | 113 | 104 |
| IT substitutions | International reach | 0.187 | 0.048 | 132 | 112 |
| Supply chain position | Firm flexibility | 0.191 | 0.048 | 127 | 108 |
| Private sector | Market awareness | 0.189 | 0.048 | 131 | 110 |
| Professional collaboration | Cost knowledge | 0.190 | 0.048 | 128 | 108 |
| Employment market | Firm flexibility | 0.186 | 0.049 | 134 | 112 |
| Institute CPD | Work methods | 0.185 | 0.050 | 138 | 113 |

Appendix L Evaluative Research / Case Study Data Normality Checks

Table 108: Case 1 Tests of Normality - Attribute Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|---|------------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership (A1) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Market awareness (A2) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Strategic management (A3) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Firm flexibility (A4) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| People management (A5) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Interpersonal skill (A6) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Communication skill (A7) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Rigour (A8) | | 3 | | | 3 | |
| Teamwork (A9) | | 3 | | | 3 | |
| Ethical conduct (A10) | | 3 | | | 3 | |
| Relationship management (A11) | | 3 | | | 3 | |
| Client quality (A12) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Networks (A13) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Brand (A14) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| International reach (A15) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Knowledge management (A16) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Work methods (A17) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| IT systems (A18) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Training (A19) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Innovation capture (A20) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Measurement ability (A21) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Estimating ability (A22) | | 3 | | | 3 | |
| Cost control ability (A23) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Cost knowledge (A24) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Construction knowledge (A25) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Legal knowledge (A26) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| "a)" Lilliefors Significance Correction | | | | | | |

Table 109: Case 1 Tests of Normality - Success Indicator Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|---|------------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Repeat business (S1) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Client feedback (S2) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Employee retention (S3) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Employee satisfaction (S4) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Fee (S5) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Operations (S6) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Workload growth (S7) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Employee number growth (S8) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Client base growth (S9) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Overall success (S10) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| "a)" Lilliefors Significance Correction | | | | | | |

Table 110: Case 2 Tests of Normality - Attribute Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|---|------------------------|----|------|--------------|----|---------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership (A1) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Market awareness (A2) | | 3 | | | 3 | |
| Strategic management (A3) | | 3 | | | 3 | |
| Firm flexibility (A4) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| People management (A5) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Interpersonal skill (A6) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Communication skill (A7) | | 3 | | | 3 | |
| Rigour (A8) | 0.385 | 3 | | 0.750 | 3 | - 0.000 |
| Teamwork (A9) | | 3 | | | 3 | |
| Ethical conduct (A10) | | 3 | | | 3 | |
| Relationship management (A11) | 0.385 | 3 | | 0.750 | 3 | - 0.000 |
| Client quality (A12) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Networks (A13) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Brand (A14) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| International reach (A15) | 0.253 | 3 | | 0.964 | 3 | 0.637 |
| Knowledge management (A16) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Work methods (A17) | | 3 | | | 3 | |
| IT systems (A18) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Training (A19) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Innovation capture (A20) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Measurement ability (A21) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Estimating ability (A22) | 0.385 | 3 | | 0.750 | 3 | - 0.000 |
| Cost control ability (A23) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Cost knowledge (A24) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Construction knowledge (A25) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Legal knowledge (A26) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| "a)" Lilliefors Significance Correction | | | | | | |

Table 111: Case 2 Tests of Normality - Success Indicator Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|---|------------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Repeat business (S1) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Client feedback (S2) | | 3 | | | 3 | |
| Employee retention (S3) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Employee satisfaction (S4) | | 3 | | | 3 | |
| Fee (S5) | | 3 | | | 3 | |
| Operations (S6) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Workload growth (S7) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Employee number growth (S8) | 0.175 | 3 | | 1.000 | 3 | 1.000 |
| Client base growth (S9) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Overall success (S10) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| "a)" Lilliefors Significance Correction | | | | | | |

Table 112: Case 3 Tests of Normality - Attribute Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|---|------------------------|----|-------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership (A1) | 0.360 | 5 | 0.033 | 0.767 | 5 | 0.042 |
| Market awareness (A2) | 0.300 | 5 | 0.161 | 0.833 | 5 | 0.146 |
| Strategic management (A3) | 0.372 | 5 | 0.022 | 0.828 | 5 | 0.135 |
| Firm flexibility (A4) | 0.231 | 5 | .200* | 0.881 | 5 | 0.314 |
| People management (A5) | 0.231 | 5 | .200* | 0.881 | 5 | 0.314 |
| Interpersonal skill (A6) | 0.241 | 5 | .200* | 0.821 | 5 | 0.119 |
| Communication skill (A7) | 0.231 | 5 | .200* | 0.881 | 5 | 0.314 |
| Rigour (A8) | 0.367 | 5 | 0.026 | 0.684 | 5 | 0.006 |
| Teamwork (A9) | 0.300 | 5 | 0.161 | 0.833 | 5 | 0.146 |
| Ethical conduct (A10) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Relationship management (A11) | 0.367 | 5 | 0.026 | 0.684 | 5 | 0.006 |
| Client quality (A12) | 0.367 | 5 | 0.026 | 0.684 | 5 | 0.006 |
| Networks (A13) | 0.241 | 5 | .200* | 0.821 | 5 | 0.119 |
| Brand (A14) | 0.231 | 5 | .200* | 0.881 | 5 | 0.314 |
| International reach (A15) | 0.349 | 5 | 0.046 | 0.771 | 5 | 0.046 |
| Knowledge management (A16) | 0.254 | 5 | .200* | 0.914 | 5 | 0.492 |
| Work methods (A17) | 0.330 | 5 | 0.079 | 0.735 | 5 | 0.021 |
| IT systems (A18) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Training (A19) | 0.300 | 5 | 0.161 | 0.833 | 5 | 0.146 |
| Innovation capture (A20) | 0.300 | 5 | 0.161 | 0.833 | 5 | 0.146 |
| Measurement ability (A21) | 0.349 | 5 | 0.046 | 0.771 | 5 | 0.046 |
| Estimating ability (A22) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Cost control ability (A23) | 0.349 | 5 | 0.046 | 0.771 | 5 | 0.046 |
| Cost knowledge (A24) | | 5 | | | 5 | |
| Construction knowledge (A25) | 0.367 | 5 | 0.026 | 0.684 | 5 | 0.006 |
| Legal knowledge (A26) | | 5 | | | 5 | |
| "*" This is a lower bound of the true significance. | | | | | | |
| "(a)" Lilliefors Significance Correction | | | | | | |

Table 113: Case 3 Tests of Normality - Success Indicator Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|---|------------------------|----|-------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Repeat business (S1) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Client feedback (S2) | 0.231 | 5 | .200* | 0.881 | 5 | 0.314 |
| Employee retention (S3) | 0.300 | 5 | 0.161 | 0.883 | 5 | 0.325 |
| Employee satisfaction (S4) | 0.231 | 5 | .200* | 0.881 | 5 | 0.314 |
| Fee (S5) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Operations (S6) | 0.372 | 5 | 0.022 | 0.828 | 5 | 0.135 |
| Workload growth (S7) | 0.349 | 5 | 0.046 | 0.771 | 5 | 0.046 |
| Employee number growth (S8) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Client base growth (S9) | 0.473 | 5 | 0.001 | 0.552 | 5 | 0.000 |
| Overall success (S10) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| "*" This is a lower bound of the true significance. | | | | | | |

"(a)" Lilliefors Significance Correction

Table 114: Case 4 Tests of Normality - Attribute Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|-------------------------------|------------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership (A1) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Market awareness (A2) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Strategic management (A3) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Firm flexibility (A4) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| People management (A5) | 0.260 | 4 | | 0.827 | 4 | 0.161 |
| Interpersonal skill (A6) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Communication skill (A7) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Rigour (A8) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Teamwork (A9) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Ethical conduct (A10) | | 4 | | | 4 | |
| Relationship management (A11) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Client quality (A12) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Networks (A13) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Brand (A14) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| International reach (A15) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Knowledge management (A16) | 0.329 | 4 | | 0.895 | 4 | 0.406 |
| Work methods (A17) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| IT systems (A18) | 0.329 | 4 | | 0.895 | 4 | 0.406 |
| Training (A19) | 0.260 | 4 | | 0.827 | 4 | 0.161 |
| Innovation capture (A20) | 0.298 | 4 | | 0.849 | 4 | 0.224 |
| Measurement ability (A21) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Estimating ability (A22) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Cost control ability (A23) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Cost knowledge (A24) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Construction knowledge (A25) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Legal knowledge (A26) | 0.283 | 4 | | 0.863 | 4 | 0.272 |

"(a)" Lilliefors Significance Correction

Table 115: Case 4 Tests of Normality - Success Indicator Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|-----------------------------|------------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Repeat business (S1) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Client feedback (S2) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Employee retention (S3) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Employee satisfaction (S4) | 0.260 | 4 | | 0.827 | 4 | 0.161 |
| Fee (S5) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Operations (S6) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Workload growth (S7) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Employee number growth (S8) | 0.283 | 4 | | 0.863 | 4 | 0.272 |

| | | | | | | |
|--|-------|---|--|-------|---|-------|
| Client base growth (S9) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| Overall success (S10) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| "(a)" Lilliefors Significance Correction | | | | | | |

Table 116: Case 5 Tests of Normality - Attribute Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|--|------------------------|----|------|--------------|----|---------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Leadership (A1) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Market awareness (A2) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Strategic management (A3) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Firm flexibility (A4) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| People management (A5) | 0.329 | 4 | | 0.895 | 4 | 0.406 |
| Interpersonal skill (A6) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Communication skill (A7) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Rigour (A8) | 0.385 | 3 | | 0.750 | 3 | - 0.000 |
| Teamwork (A9) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Ethical conduct (A10) | | 4 | | | 4 | |
| Relationship management (A11) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Client quality (A12) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Networks (A13) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Brand (A14) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| International reach (A15) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Knowledge management (A16) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Work methods (A17) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| IT systems (A18) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Training (A19) | 0.283 | 4 | | 0.863 | 4 | 0.272 |
| Innovation capture (A20) | 0.250 | 4 | | 0.945 | 4 | 0.683 |
| Measurement ability (A21) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Estimating ability (A22) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Cost control ability (A23) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Cost knowledge (A24) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Construction knowledge (A25) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Legal knowledge (A26) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| "(a)" Lilliefors Significance Correction | | | | | | |

Table 117: Case 5 Tests of Normality - Success Indicator Performance Rating Data

| Attribute | Kolmogorov-Smirnov (a) | | | Shapiro-Wilk | | |
|----------------------------|------------------------|----|------|--------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Repeat business (S1) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Client feedback (S2) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Employee retention (S3) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Employee satisfaction (S4) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Fee (S5) | | 2 | | | | |
| Operations (S6) | | 3 | | | 3 | |

| | | | | | | |
|--|-------|---|--|-------|---|-------|
| Workload growth (S7) | 0.307 | 4 | | 0.729 | 4 | 0.024 |
| Employee number growth (S8) | 0.441 | 4 | | 0.630 | 4 | 0.001 |
| Client base growth (S9) | 0.250 | 4 | | 0.945 | 4 | 0.683 |
| Overall success (S10) | 0.385 | 3 | | 0.750 | 3 | 0.000 |
| "(a)" Lilliefors Significance Correction | | | | | | |

Appendix M Model 1 Spearman's Rank Correlation Test – Performance and Success

Table 118: Model 1 Spearman's Rank Correlation Test – Performance and Success (alpha = 0.10) [part 1]

| Attribute | Correlation | Repeat business (S1) | Client feedback (S2) | Employee rete... (S3) | Employee sat... (S4) | Revenue (S5) | Operations (S6) | Workload gro... (S7) | Employee nu... (S8) | Client base gr... (S9) | Overall success (S10) |
|-----------------------|-------------|----------------------|----------------------|-----------------------|----------------------|--------------|-----------------|----------------------|---------------------|------------------------|-----------------------|
| Internal Factor 1 | ρ | -0.158 | 0.359 | -0.616 | 0.500 | 0.763 | 0.667 | 0.410 | 1.000 | 0.711 | 0.462 |
| | Sig. | 0.800 | 0.553 | 0.269 | 0.391 | 0.133 | 0.219 | 0.493 | 0.000 | 0.179 | 0.434 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-2 | ρ | -0.051 | 0.300 | 0.100 | 0.872 | 0.205 | 0.400 | 0.000 | 0.667 | 0.103 | 0.600 |
| | Sig. | 0.935 | 0.624 | 0.873 | 0.054 | 0.741 | 0.505 | 1.000 | 0.219 | 0.870 | 0.285 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-3 | ρ | 0.051 | 0.400 | 0.500 | 0.718 | 0.051 | 0.300 | -0.100 | 0.359 | -0.103 | 0.300 |
| | Sig. | 0.935 | 0.505 | 0.391 | 0.172 | 0.935 | 0.624 | 0.873 | 0.553 | 0.870 | 0.624 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-4 | ρ | 0.410 | 0.700 | 0.600 | 0.564 | 0.154 | 0.500 | 0.200 | 0.205 | 0.051 | 0.100 |
| | Sig. | 0.493 | 0.188 | 0.285 | 0.322 | 0.805 | 0.391 | 0.747 | 0.741 | 0.935 | 0.873 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-5 | ρ | 0.667 | 0.900 | 0.300 | 0.564 | 0.410 | 0.800 | 0.600 | 0.359 | 0.410 | 0.200 |
| | Sig. | 0.219 | 0.037 | 0.624 | 0.322 | 0.493 | 0.104 | 0.285 | 0.553 | 0.493 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-6 | ρ | 0.564 | 0.800 | -0.100 | 0.718 | 0.564 | 0.900 | 0.700 | 0.667 | 0.616 | 0.500 |
| | Sig. | 0.322 | 0.104 | 0.873 | 0.172 | 0.322 | 0.037 | 0.188 | 0.219 | 0.269 | 0.391 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-7 | ρ | 0.564 | 0.800 | -0.100 | 0.718 | 0.564 | 0.900 | 0.700 | 0.667 | 0.616 | 0.500 |
| | Sig. | 0.322 | 0.104 | 0.873 | 0.172 | 0.322 | 0.037 | 0.188 | 0.219 | 0.269 | 0.391 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-8 | ρ | 0.564 | 0.800 | -0.100 | 0.718 | 0.564 | 0.900 | 0.700 | 0.667 | 0.616 | 0.500 |
| | Sig. | 0.322 | 0.104 | 0.873 | 0.172 | 0.322 | 0.037 | 0.188 | 0.219 | 0.269 | 0.391 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-9 | ρ | 0.564 | 0.800 | -0.100 | 0.718 | 0.564 | 0.900 | 0.700 | 0.667 | 0.616 | 0.500 |
| | Sig. | 0.322 | 0.104 | 0.873 | 0.172 | 0.322 | 0.037 | 0.188 | 0.219 | 0.269 | 0.391 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-10 | ρ | 0.564 | 0.800 | -0.100 | 0.718 | 0.564 | 0.900 | 0.700 | 0.667 | 0.616 | 0.500 |
| | Sig. | 0.322 | 0.104 | 0.873 | 0.172 | 0.322 | 0.037 | 0.188 | 0.219 | 0.269 | 0.391 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-11 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-12 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-13 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

Table 119: Model 1 Spearman's Rank Correlation Test – Performance and Success (alpha = 0.10) [part 2]

| Attribute | Correlation | Repeat business (S1) | Client feedback (S2) | Employee rete... (S3) | Employee sat... (S4) | Revenue (S5) | Operations (S6) | Workload gro... (S7) | Employee nu... (S8) | Client base gr... (S9) | Overall success (S10) |
|-----------------------|-------------|----------------------|----------------------|-----------------------|----------------------|--------------|-----------------|----------------------|---------------------|------------------------|-----------------------|
| Internal Factors 1-14 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-15 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-16 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-17 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-18 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-19 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-20 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-21 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-22 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-23 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-24 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-25 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-26 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

Appendix N Model 2 Spearman's Rank Correlation Test – Performance and Success

Table 120: Model 2 Spearman's Rank Correlation Test – Performance and Success (alpha = 0.10) [part 1]

| Attribute | Correlation | Repeat business (S1) | Client feedback (S2) | Employee rete... (S3) | Employee sat... (S4) | Revenue (S5) | Operations (S6) | Workload gro... (S7) | Employee nu... (S8) | Client base gr... (S9) | Overall success (S10) |
|-----------------------|-------------|----------------------|----------------------|-----------------------|----------------------|--------------|-----------------|----------------------|---------------------|------------------------|-----------------------|
| Internal Factor 1 | ρ | 0.526 | 0.667 | 0.205 | -0.553 | 0.395 | 0.410 | 0.564 | -0.263 | 0.395 | -0.718 |
| | Sig. | 0.362 | 0.219 | 0.741 | 0.334 | 0.511 | 0.493 | 0.322 | 0.669 | 0.511 | 0.172 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-2 | ρ | 0.821 | 0.900 | 0.000 | -0.051 | 0.564 | 0.800 | 0.900 | 0.103 | 0.667 | -0.200 |
| | Sig. | 0.089 | 0.037 | 1.000 | 0.935 | 0.322 | 0.104 | 0.037 | 0.870 | 0.219 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-3 | ρ | 0.821 | 0.900 | 0.000 | -0.051 | 0.564 | 0.800 | 0.900 | 0.103 | 0.667 | -0.200 |
| | Sig. | 0.089 | 0.037 | 1.000 | 0.935 | 0.322 | 0.104 | 0.037 | 0.870 | 0.219 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-4 | ρ | 0.718 | 0.800 | -0.400 | 0.103 | 0.718 | 0.900 | 1.000 | 0.410 | 0.872 | 0.100 |
| | Sig. | 0.172 | 0.104 | 0.505 | 0.870 | 0.172 | 0.037 | 0.000 | 0.493 | 0.054 | 0.873 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-5 | ρ | 0.718 | 0.800 | -0.400 | 0.103 | 0.718 | 0.900 | 1.000 | 0.410 | 0.872 | 0.100 |
| | Sig. | 0.172 | 0.104 | 0.505 | 0.870 | 0.172 | 0.037 | 0.000 | 0.493 | 0.054 | 0.873 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-6 | ρ | 0.718 | 0.800 | -0.400 | 0.103 | 0.718 | 0.900 | 1.000 | 0.410 | 0.872 | 0.100 |
| | Sig. | 0.172 | 0.104 | 0.505 | 0.870 | 0.172 | 0.037 | 0.000 | 0.493 | 0.054 | 0.873 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-7 | ρ | 0.718 | 0.800 | -0.400 | 0.103 | 0.718 | 0.900 | 1.000 | 0.410 | 0.872 | 0.100 |
| | Sig. | 0.172 | 0.104 | 0.505 | 0.870 | 0.172 | 0.037 | 0.000 | 0.493 | 0.054 | 0.873 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-8 | ρ | 0.821 | 0.900 | 0.000 | -0.051 | 0.564 | 0.800 | 0.900 | 0.103 | 0.667 | -0.200 |
| | Sig. | 0.089 | 0.037 | 1.000 | 0.935 | 0.322 | 0.104 | 0.037 | 0.870 | 0.219 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-9 | ρ | 0.667 | 1.000 | 0.100 | 0.205 | 0.667 | 0.900 | 0.800 | 0.359 | 0.667 | -0.100 |
| | Sig. | 0.219 | 0.000 | 0.873 | 0.741 | 0.219 | 0.037 | 0.104 | 0.553 | 0.219 | 0.873 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-10 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-11 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-12 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Internal Factors 1-13 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

Table 121: Model 2 Spearman's Rank Correlation Test – Performance and Success (alpha = 0.10) [part 2]

| Attribute | Correlation | Repeat business (S1) | Client feedback (S2) | Employee rete... (S3) | Employee sat... (S4) | Revenue (S5) | Operations (S6) | Workload gro... (S7) | Employee nu... (S8) | Client base gr... (S9) | Overall success (S10) |
|-----------------|-------------|----------------------|----------------------|-----------------------|----------------------|--------------|-----------------|----------------------|---------------------|------------------------|-----------------------|
| Attributes 1-14 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-15 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-16 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-17 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-18 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-19 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-20 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-21 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-22 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-23 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-24 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-25 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Attributes 1-26 | ρ | 0.564 | 0.900 | -0.300 | 0.359 | 0.821 | 1.000 | 0.900 | 0.667 | 0.872 | 0.200 |
| | Sig. | 0.322 | 0.037 | 0.624 | 0.553 | 0.089 | 0.000 | 0.037 | 0.219 | 0.054 | 0.747 |
| | N | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |