Graduate School of Business

Non-compliance by school principals: the effects of experience, stakeholder characteristics and governance mechanisms on reasoned risk-taking in decision-making

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Declaration

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgment has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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Karen Joy Trimmer

12 April 2011

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Reasoned risk-taking has long been associated with governance mechanisms for organisations within business contexts. Research has been conducted in business contexts to develop theories of risk-taking that incorporate governance mechanisms and stakeholder mechanisms, including the experience of management. This study applies these theories in the context of the public sector, in particular the environment of public schools, to explore the problem of risk-taking in decision-making by school principals. Here, risk-taking is defined as when decisions are made that are not compliant with the *regulatory framework*, the primary governance mechanism for public schools in Western Australia. Such decisions involve risk as principals may be exposed to criticism for non-compliance with established policy when negative outcomes arise from decision-making. This creates a dilemma for principals who need to be able to respond to the locally identified needs within a school, and simultaneously comply with all State and Commonwealth departmental requirements.

In exploring this area, this research applies the lens of complexity theory, agency and behavioural perspectives to determine whether reasoned risk-taking by school principals is a consequence of their perceptions of the governance mechanism of the *regulatory framework*, the experience of individual principals and the characteristics of key stakeholders within the school community. In a familiarisation study, qualitative interview and questionnaire data collected from 71 principals and 18 district directors in Western Australian government schools was used to determine factors impacting on risk-taking in decision-making by principals and to develop a model of reasoned risk-taking in decision-making. Further confirmatory data was collected through the survey of a stratified random sample of principals in 253 Western Australian government schools. The questionnaire included measures of both attitude and behaviour of principals. The survey data was analysed using Rasch modeling and each construct in the model explored with factor analysis. Finally the model was analysed using Partial Least Square (PLS) based structural equation modeling.

Results of the analysis show support for the hypothesised model and identify a range of factors impacting on risk-taking in decision-making by school principals. Both the level and type of experience of principals were found to have significant influence on risk-

taking in decision-making, with implications for governance structures and the devolution of control for decision-making and accountability for outcomes in schools. Principals' perceptions of the purpose of the governance mechanism were also significant and were mediated by their levels and type of experience. This finding has implications for the Department's new initiative of Independent Public Schools which marks a departure from the governance framework based on a compliance approach through a centralised hierarchical structure. The research provides insight into the use of the *regulatory framework* by principals and its alignment to the strategic direction of devolution of local decision-making to schools. The findings can be utilised to in the development of strategic policy for governance of public schools and to enhance professional development of principals in decision-making.

The study provides a theoretical contribution through the use of a methodology that combines sequential use of psychometric and traditional measurement techniques. Such combined techniques have been recently used in educational contexts but such studies are limited at present and the methodology may provide a more rigorous approach. In addition, the research provides a case study of the cause and solution of a reverse coding problem in PLS structural equation modeling that has not been previously considered in the literature.

CHAPTER ONE

1 OVERVIEW AND CONTEXTUAL BACKGROUND

1.1 OVERVIEW

The purpose of this study was to identify and model factors impacting on principals' perceptions of the "regulatory framework" (Department of Education and Training, 2004) and to test how these factors impact on their decision-making processes within the school environment. This is important for the delivery of education programs in schools as principals experience conflict in decision-making when decision solutions that provide the best educational outcomes for students do not comply with Departmental requirements within the regulatory framework. Principals need to be able to respond to the locally identified needs within a school, and simultaneously comply with all State and Commonwealth departmental requirements. Principals may be exposed to risk in their decision-making through criticism for non-compliance with established policy when they are unable to meet conflicting requirements, or when negative outcomes arise from decision-making.

Research has been conducted in a range of business contexts to develop theories of risk-taking that incorporate governance mechanisms and stakeholder mechanisms, including the experience of management (Libby & Fishburn, 1977; Wiseman & Gomez-Meija, 1998; Wiseman, Gomez-Mejia & Fugate, 2000; Carpenter & Westphal, 2001; Carpenter, Pollock & Leary, 2003; Nicholson et al. 2005; Petrakis, 2005). However, each of these studies has been conducted within the context of a business environment. Investigation of the applicability of these theories within public sector contexts is lacking. This study is significant in that it seeks to apply these theories and develop a theoretical model of risk-taking in decision-making within the public sector environment of public schools.

This chapter outlines the purpose of the study and the background in which it is set. It then reviews the context in which the study was conducted by presenting an overview

of corporate governance in the public sector, with a focus on the Western Australian educational environment. The educational policy context is then described in an historical overview of the development of the regulatory framework system (Department of Education and Training, 2004). The key objectives of the study, research questions and definition of two key terms are presented in conjunction with an outline of the significance of the research and limitations of the study. This is followed by a brief discussion of the research methods and associated ethical issues. The chapter concludes with an overview of the structure of the thesis.

1.2 BACKGROUND

1.2.1 National and International Trends Toward Decentralisation of Decision-making in Education

There is currently a conflict between the rhetoric of decentralisation and external requirements in Australian schools. Since the 1960's the political climate of Western nations, and demands of cultural minorities and the feminist movement for increased participation, have contributed to the rise of school-based decision-making and management as an administrative strategy in education (Seddon, Angus & Poole, 1990, pp.29-41). In a comparison of 19 countries, the 2004 Organisation for Economic Co-operation and Development (OECD) report found that in 14 countries, decisions were being made at a more decentralised level in 2003 than was evident in 1998. In contrast to this, Australia was found to be one of the countries with the most centralised educational decision-making (Caldwell, 2006, p.65). This is despite research and government reports, such as the Karmel Report (1973, p.10), recommending that Australian schools move towards a more decentralised form of management. A commitment to decentralisation and devolution of authority in education was made at a national level following the election of the Australian Labor Party in 1983 (Caldwell, 1990, p.5) and national and state government initiatives over recent years are still tending to move in this direction (Eacott, 2009; Department of Education and Training, 2009). This policy trend towards decentralisation is at odds with the move to increase government requirements for accountability in Australian schools.

The dichotomy created by decentralisation, in combination with increased external accountability, creates a dilemma for school principals. The impact of management

demands and the requirements of central education authorities in constraining innovation in schools has been an issue of debate for many years (Sarason, 1982; Bennis & Nanus, 1985; Sergiovanni, 2000; Starr, 2008). Principals have the dual task of being instructional leaders to ensure that students attain achievement standards and simultaneously lead and manage the organisation of the school. As each school is a component of a larger organisation, there are requirements imposed from the organisational executive regarding both educational and business aspects of the leadership role of principals. Sergiovanni (2000, p.166) observes that school professionals don't have a "high tolerance for bureaucratic rituals" as they are often responding to a range of competing stakeholder demands in a politically exposed environment. Fullan (1993, p.22) concludes that "you can't mandate what matters" as educational goals are complex and require discretionary judgement. This view is supported by the research on school effectiveness and school improvement that has been consistently supportive of school-based decision-making and management (Caldwell, 1990, p.19).

The issue of devolution of school decision-making, came to the political fore in Western Australia in 2001, with the publication of two government reports that focused specifically on Western Australian public schools. The *Evaluation Study of the Local Management of Schools Pilot Study* (Cummings & Stephenson, 2001) indicated that "the bureaucratic nature of Central Office and the plethora of rules were identified as impeding progress with local management". Similarly, the report, *Investing in Government Schools: Putting Children First*, (Robson, Harken & Hill, 2001) found that administration through system-wide management policies does not recognise the diversity that exists across education districts. The report stated that "locally-managed schools are seen as being more responsive to local needs" (Robson, Harken & Hill, 2001, p.13). The implication of these reports was that there is a risk that over-regulation could act as a barrier impeding innovation and the flexibility to implement the most appropriate response in schools given local community opportunities, considerations and conditions. Caldwell (1990, p.19) expressed the view that the key to the management of the conflict around decision-making in schools that has arisen from centralisation of policies is "dependent on minimizing the number of constraining rules and regulations". Similarly, Wong (1997) indicated that one of the major

strategies for reducing bureaucratic power in education is the empowerment of professionals to be involved in shared decision-making on policy at the school site.

A number of these issues had already been brought to the attention of the Western Australian Department of Education in consideration of new State legislation regarding education. In readiness for promulgation and implementation of the new *School Education Act* (School Education Act, 1999) a review of the Western Australian Department of Education's policy framework was commenced in 1999. This included a review of the policy framework for governance of schools. Following the 1999 review, significant work was undertaken centrally by the Department to provide coordinated access to all documentation related to policy in a consistent format. Policy and procedures documents for the Department are now maintained and disseminated in a regulatory framework. The regulatory framework is the repository for all mandatory policy and procedures documentation required for governance and is used by principals for decision-making within the school environment in Western Australian government schools. The regulatory framework is accessible via the Internet and a CD ROM that was distributed to every education district office and school at the commencement of each school term from 2001 till the end of 2005.

1.2.2 Corporate Governance in the Public Sector Context

Corporate governance refers to the processes by which organisations are directed and controlled. This includes the processes of leadership, control, performance management, accountability and ethics in the organisation. A key aspect of the governance structures in the public sector are the legislative frameworks that underpin and guide the goals and objectives of public sector agencies. Legislative structures, at Commonwealth, State and local government levels, form a central part of public sector governance structures. Public sector agencies are regulated by legislative frameworks that determine the agency mission and guide the implementation of programs, and associated organisational structures. This reflects Collier and Roberts' (2001, p.68) view that "the state and legal institutions play a key role in setting ground rules and enforcing sanctions". Allison (1983, p.79) indicated that public sector managers are more often subject to such legislative and judicial impacts to the extent that "close

scrutiny by legislative oversight groups or even judicial orders often materially constrain executive and administrative freedom to act". In this way legislative structures impact significantly on the corporate governance of public sector agencies.

The legislative framework consists of the constitution and legislation and also rulings and common law arising from them. This includes legislation with broad application such as enabling legislation for particular public sector agencies. Compliance with the legislation may be a key component in the achievement of stated agency outcomes and can appear in the Chief Executive Officer's (CEO) Performance Agreement or the Key Performance Indicators required for agency accountability and audit purposes to be included in the Annual Report for the agency. Internal accountability structures and management processes are consequently put in place to support achievement of compliance with the legislative framework for the agency. These can include internal audit processes, business and other planning processes, quality control systems, risk management and performance monitoring.

To ensure these legislative requirements are met, agencies undertake comprehensive planning to identify long term outcomes, strategic initiatives to achieve them and monitoring processes to evaluate their performance. Within the Department of Education and Training, a series of plans have been developed to form an integrated structure for corporate governance. These include:

- *Plan for Government Schools 2004-2007*
- *Department's Strategic Plan 2007-2009*
- *Plan for Government Schools 2008-2011*
- *TAFEWA Strategic Plan 2006-2010*
- *Classroom First Strategy*
- *Commonwealth-State Agreement for Skilling Australia's Workforce 2005-2008*
- *Shaping our Future, Australia's National Strategy for Vocational Education and Training 2004-2010*
- *Australian Government Programmes for Schools Quadrennial Administrative Guidelines*

The *Plan for Government Schools 2004-2007* was the principal planning document for schools in the time period that this study was conducted. It indicates the core values of the Department of Education and Training and also outlines both the overall objective and four key subsidiary objectives that the organisation sought to achieve. These are:

- Overall Objective: (p.12) *To ensure that all students achieve the standards expected of them at key stages of schooling;*
- Key Objective 1: (p.14) *To develop and support flexible approaches to teaching and learning that motivate and engage students in appropriate educational programs;*
- Key Objective 2: (p.16) *To promote professional learning; develop professional knowledge and expertise; and ensure that all staff are valued and supported;*
- Key Objective 3: (p.18) *To ensure that schools support and provide for the learning, physical, emotional and behavioural needs of all students;*
- Key Objective 4: (p.20) *To provide strong organisational support for the work of schools.*

The document also provides strategies to be implemented to achieve the objectives and specifies performance measures and targets against which to monitor performance.

Ethical structures, including public sector standards, codes of conduct and codes of ethics also form an integral part of the accountability within the public sector context. Barrett (1999, p.7) argued that the emergence of more contestable environments makes it essential that public sector agencies maintain and enhance accountability while meeting traditional ethical and professional standards. This includes issues such as client satisfaction, justice, equity of service provision, probity in serving the public interest and loyalty. Within the Department, district directors, central office directors and executives provide leadership and management to link these strategic plans and ensure compliance to public sector standards and ethics across the public school system. This aligns with Collier and Roberts' (2001, p.67) view that the duties of directors "lie in aligning and balancing a wide variety of potentially competitive interests" within an organisation. For the Department of Education and Training these competing interests include a number of stakeholders that need to be taken into account in the constitution and conduct of corporate governance within the agency. Consideration

needs to be given to the views of the relevant State government Minister, organisations and agencies with an interest in public education, Catholic and independent education providers, tertiary education providers, the general community and the principals and staff of schools.

Barrett (1999, p.20) emphasised the importance for accountability of clear designation of roles and responsibilities of each of the participants in the governance framework, including the responsible Minister, board, CEO and stakeholders. Accountability for achievement of outcomes and maintenance of standards within each school is the responsibility of the principal as plans are put into effect in each individual school under the principal's leadership. The requirements and responsibilities for principals are documented in policy and procedures documents that comprise the regulatory framework. The regulatory framework of policies is a key accountability structure that assists in managing risk and maintaining consistent quality and standards in service delivery across a wide range of schools in the state of Western Australia.

In addition to state accountability requirements, there is currently also a national emphasis on standards-based accountability in education (Bauer & Bogotch, 2006, p.449). Recently, the Council of Australian Governments (COAG) has moved to implement a requirement for all Australian states to provide publicly available reports on schools' achievement on nationally administered tests in relation to established benchmark standards for literacy and numeracy (National Education Agreement, 2008, p.7-9; National Partnership Agreement on Low Socio-economic Status School Communities, 2008, pp.7; National Partnership Agreement on Literacy and Numeracy, 2008, pp.7; COAG Communique, 2008, p.20-21; Federalist Paper 2, 2007, p.23). They have also called for a move to a national curriculum (Federalist Paper 2, 2007, p.20). This trend toward centrally determined standards and curriculum as seen in Australia is not universal. Karstanje (1999) reports that Western, Central and Eastern European countries are moving toward decentralisation and deregulation to allow schools to respond flexibly to local or regional needs and circumstances. Also in China there has been a strong trend to decentralisation in educational governance (Mok, 2001, pp.123-124). An emphasis on standards-based accountability, such as is occurring in

Australia, reinforces the responsibility of schools and principals to conform with and achieve institutionally set goals.

Consistency and universalism have been lauded as critical aims in public education to ensure equity of access and opportunity for all students (Jamieson & Wikely, 2001, p.163). Compliance with universally required policy positions in education and schools promotes this ideal. However, as Jamieson and Wikely (2001) point out, this view is ideologically incompatible with the paradigm of responding to the individual needs of children. The current educational culture is dominated by the forces of managerialism and standards which creates a dilemma for schools in trying to make decisions to meet the learning needs of their individual school whilst meeting the externally imposed requirements of these bureaucratic influences (McMahon, 2001, p136). A recent Federalist Paper (Council for Australian Federation, 2007; p.33-34) recognised that Commonwealth and State regulation, in addition to operational policies within school systems, impose an administrative burden on schools. Similarly, in the United Kingdom, Dalton and Read (2001, p.59) report that some school staff were unable to distinguish between school strategies and the government and OFSTED standards agenda, due to the significant pressure to comply with these external requirements. Eacott (2009, p.3) takes this further, and states that these government policy initiatives, including professional standards, league tables, and school-based management provide evidence of the politicisation of education. These government agendas and policy initiatives place pressure on principals to comply with external requirements that may be contrary to identified strategies for education at the school level.

To address issues such as client satisfaction, social justice, and equity of service provision, the Department of Education and Training, as the principal provider of education across the state, needs to ensure that services are provided in areas and geographic regions that are not commercially viable and where no other providers exist. The quality of the process of assessing the needs in such areas and provision of educational services that meet these identified local needs, is fundamental to the success of schools and educational strategies put in place by the Department. Information gathered through consultations with peak bodies, local community organisations and community members is a valuable resource for planning to

determine local needs. Where local stakeholders are aware and accepting of decision-making processes there are opportunities for an improved contribution to the planning and development of services that begin to address the issues of client satisfaction, justice, and equity of service provision. In Western Australia, decentralised governance has been introduced to some degree through provision in the *School Education Act* (School Education Act, 1999) for school councils involving parent and community members. However, the role of school councils is limited and principals are provided with guidance for their decision-making by centrally developed educational policy and procedures included on the regulatory framework. The dilemma for principals is to be able to translate the locally identified needs into a local educational program within a school and simultaneously comply with all State and Commonwealth departmental requirements.

Transparency and promotion of decision-making processes within the school and broader community are critically important to achieve the balance of local input with external requirements. Improved transparency of the use of information can enhance both the public sector's on-going contribution to education and the acceptance of new educational strategies within the community. This is a component of corporate governance of particular significance to the public sector. As Allison (1983, p.74) indicated, management within the public sector tends to be exposed to public scrutiny and as a consequence tends to be more open, while in contrast private business management tends to be more internal and less exposed to public review. This creates public awareness of the performance of schools and promotes community expectations of the quality of services delivered. In this case communities have an expectation that outcomes achieved across schools will be equitable across all schools regardless of geographical or other local factors. The regulatory framework is in place to assure consistency in application of policy and procedures, but a limitation may be that consistency in inputs may constrain decision-making by principals and the development of innovation in service improvement that would achieve more equitable outcomes for students.

1.2.3 The Organisation

This study is limited to government schools in Western Australia which are administered centrally through a state public sector agency. A brief description of the

agency, its structure and responsibilities is given below to provide a context for understanding government school decision-making in Western Australia.

The Western Australian Department of Education and Training is a state public sector agency responsible for the provision of education and training at government funded schools and colleges of Technical and Further Education (TAFE) throughout Western Australia. The responsibility for schools includes the provision of pre-primary, primary, secondary and post-compulsory schooling to over 250,000 students across 800 school sites. The Department employs over 25,000 employees, primarily teachers (68%). The remainder of the workforce comprises support staff (22%), administrative and clerical staff (6%) and cleaners and gardeners (4%). The ratio of management to workers in schools is low, with principals accounting for less than 0.05% of the total number of school based staff.

Principals of government schools are provided with guidance for their decision-making by centrally developed educational policy and procedures included on the regulatory framework. The regulatory framework provides a mechanism for assuring regulatory compliance across the department. The regulatory framework consists of the Acts, Regulations, delegations, policies, procedures and Chief Executive Officer's Instructions that together establish the mandatory rules of operation for all officers of the Department of Education and Training employed in the provision of education in government schools. In order to provide assurance to principals that they have located and referred to all relevant policy documentation, all mandatory documents are included in the one place. The regulatory framework contains all of the policy and procedures documentation required for governance and is used by principals in decision-making within the school environment. Guidelines are also included in the regulatory framework to provide advice and examples of good practice for implementing policy and procedures. Guidelines are not mandatory, but are included in the framework to assist principals in implementing policies and procedures in schools.

The supervision of principals' decision-making in schools is minimal. Performance management processes are in place and district directors conduct an annual review of

school and principal performance. However, on a day-to-day basis, principals take the responsibility of decision-making at the local school level with the requirement that it occurs within the guidelines of the regulatory framework. For more complex issues, the district office would be consulted for advice on implementation within the boundaries provided by the regulatory framework. Sarason (1990) indicates that the risk disposition of principals in undertaking decision-making within their school can be accounted for in part by requirements in the corporate governance systems and their perceptions of the "tolerance" of risk-taking within the system. As a consequence, some principals with a higher risk disposition may take the responsibility for making decisions within their school that are not within the guidelines of the regulatory framework.

1.2.4 Brief History of the Development of the Regulatory Framework System (RFS)

The regulatory framework is the governance mechanism that will be used as the focus of this study. A brief outline of its historical development is therefore necessary to understand its significance for decision-making by principals in Western Australian schools.

In order to streamline policy development and enhance access to and use of policy in school decision-making, centralised document collection was commenced during the 1970s. Prior to this time, documents were held in a variety of locations. Two principals were seconded into the Department's central office to undertake the collection process. The purpose was to streamline policy development and access to policy within the Department as a mechanism to promote increased use and compliance by principals. Approximately 140 documents were collected, reproduced electronically and made available to principals and districts. Referred to as the policy framework, the files were meant to provide one point of access to all Departmental policy. Subsequent work on identifying and collating all policy documents was carried out by Human Resources staff during the 1980's.

In the mid 1990's staff within Strategic Initiatives Policy and Planning began the work of developing the regulatory framework. At this time a computer program to provide access to the collection was also developed and loaded on to individual machines. However, in schools this meant that policy documents were most often only available from the principal's office thereby impeding access by teachers and other administrative staff. Similar access problems were experienced at district education offices. Lack of access translated to a lack of knowledge and consequently a heightened risk of failure to implement Department policy when required. In an attempt to address this problem, a program was developed for EdWeb, the Department's intranet website, to provide on-line access for a greater range of staff. This was developed in a way that would allow transfer to the Internet at a later time.

Even though considerable progress was made in moving toward a consistent regulated policy framework, a range of other problems were experienced with the central collection of policy. There were a range of different mechanisms used for disseminating policy. These included electronic communications (EdMatters, EdMail and FaxFile) as well as printed documents produced by many directorates within the Department. As a consequence, there was a lack of consistency in definition of what constituted policy and consequently some policy documents were not included in the central collection. Compounding this problem was the wide range of formats used for documents.

In recognition of these problems and in readiness for promulgation and implementation of the new *School Education Act 1999,* a review of the Department's policies was commenced in 1999 to ensure they were consistent with the new legislation. This included a review of the *Policy Framework*. Following the 1999 review, significant work was undertaken to provide coordinated development and access to all documentation related to policy in a consistent format. The collection of policy was now renamed as the *Regulatory Framework* and innovations such as colour coding were introduced to enable distinction between types of documents, such as legislation, awards and policies. At this time action also commenced to make the framework available on the Internet and links were introduced to provide ready access to the State Law Publisher.

With the introduction of the regulatory framework all documents were required to have an electronic record, the TRIM ID (Tower Records Information Management System). Location of an official version in the Department's electronic records system, TRIM, allowed version control. To provide greater access to the regulatory framework for staff in schools and districts where there was limited or unreliable Internet access, a CD ROM was also produced. The CD ROM was produced and distributed quarterly at the beginning of each school term from 2001 until the end of 2005, when the Department decided that all schools had adequate computing infrastructure to enable electronic access via the Internet. This was also seen to have the added advantage of further improved version control.

The process of developing and approving policy for inclusion on the regulatory framework now also includes referral to a review committee within central office. This cross-divisional group was initially convened to assist in resolution of issues arising in the development and implementation of the *School Education Act 1999* and *School Education Regulations 2000*. This role was later extended to assistance with policies being reviewed to ensure consistency with the Act and Regulations. This process includes consideration of the impact on other policy documents, consistency of structure and format of documents and editorial input. It has now been further extended to assure consistency in policy development and issues such as level and type of consultation are also considered.

A *Review of the Regulatory Framework* was conducted in 2003 (Trimmer, 2003a) to determine current use of the framework in schools and districts. A series of recommendations were endorsed by the Department's Corporate Executive with a view to:

- ensuring policies developed were aligned to the strategic direction of the Department;
- increasing the level of awareness of and access to the regulatory framework; and

- refining internal processes for development and review of policies and procedures.

In response to the second of these recommendations a new on-line repository system was developed during 2005 to make policies and other regulatory documents easily accessible in an electronic format to a range of audiences. The *Our Policies* site was launched in 2006 and is available to all schools and the community via the Internet.

1.2.5 Motivation to undertake the study

A major issue of interest arising from the 2003 *Review of the Regulatory Framework* (Trimmer, 2003a) was that a number of principals commented in interviews that they had operated outside the mandatory policy requirements in circumstances where, in their professional judgement, it was impossible to comply with the policy because of local circumstances. Instead, they based their decision on the intent of known Departmental goals. Only six percent, of a sample of 71 principals interviewed, indicated that they would always comply with policy in all circumstances (Trimmer, 2003a, p.30). The majority of principals cited instances where they had used professional discretion to make decisions that were contrary to mandatory policy and procedures. These principals maintained that this was necessary and provided explanations in interviews that highlighted the existence of specific circumstances that made compliance difficult or inappropriate (Trimmer, 2003a, pp.30-33). They also provided details of their decisions, that they deemed the most appropriate in the circumstances, and the subsequent outcomes. From the perspective of public sector management, lack of compliance leaves these principals and the Department exposed to risk as they are in breach of mandatory policy and are therefore open to disciplinary action should an untoward outcome eventuate. The Department is also at risk as they face public and Parliamentary scrutiny in a circumstance where there is no due process to account for the decision-making or action that was taken. Starr (2008) indicates that consideration of risk in schools “has risen dramatically in stakes and prominence”.

Interviews with principals also revealed that situations where compliance had not been possible occurred on an on-going basis where local circumstances, including geographical and cultural factors, were such that the population of students or the

community had significantly different characteristics than other schools. Policies and procedures are developed centrally within the Department and are intended to provide the most effective means of achieving the required outcomes in all schools and circumstances. Where specific school and community circumstances, including cultural and geographical factors, appear to demand a unique response, principals may make decisions that are not compliant with the established policy. Seventy percent of principals indicated that they were aware of instances where compliance had not been possible given the circumstances (Trimmer, 2003a, p.32). In such instances it was felt that compliance may have resulted in inappropriate, inefficient or ineffective outcomes.

There were also differences in principals' perceptions regarding the usefulness of policy and procedures in decision-making. Experienced principals, and more frequently secondary principals, indicated that they would prefer greater flexibility to make decisions at the school level to meet outcomes that took account of local circumstances. These principals expressed preference for provision of minimal mandatory policies specifying outcomes to be achieved rather than prescribed procedures. Professional expertise was seen as providing a sound basis for meeting these outcomes in a manner that was better suited to the local community. Conversely, primary principals and new or acting principals were more likely to express a preference for clearly documented policy and procedure to provide guidance in the decision-making process (Trimmer, 2003a, p.34).

The qualitative data arising from the 2003 review provided preliminary evidence that risk-taking in decision-making by school principals may be affected by factors such as an individual's view of corporate governance mechanisms, the individual's level and type of experience, and characteristics of the local school and community. This new information was the catalyst for this thesis incorporating a review of related concepts in the literature and the development of a hypothesised model.

1.3 RESEARCH QUESTIONS AND KEY OBJECTIVES

1.3.1 Research Questions

As indicated in the preceding discussion, the purpose of this study was to determine whether reasoned risk-taking by school principals is impacted by their perceptions of the governance mechanism of the regulatory framework, the experience of principals and the characteristics of key stakeholders within the school community.

Therefore the research questions for this study were:

1. Does the principal's perception of the *regulatory framework* impact on the principal's decision-making process within the school?
2. Does the level of experience of school principals impact on their likelihood to engage in reasoned risk-taking in decision-making?
3. Do stakeholder characteristics for communities and schools impact on risk-taking in decision-making by principals?

These research questions are developed into testable hypotheses in Chapter 3.

1.3.2 Research Objectives

Based on the research questions above, the following key objectives were pursued through this study:

1. To identify factors impacting on risk-taking in decision-making by school principals.
2. To examine how principals' perceptions of the purpose of the regulatory framework impact on decision-making.
3. To investigate the association between each of the factors identified and level of risk-taking in decision-making by school principals.

These objectives were considered throughout this study and the literature review reflects on them as a focus. The results of the hypothesis testing and subsequent discussion in Chapter 6 lead to a deeper understanding of the issues underlying the objectives.

1.4 DEFINITION OF TERMS

The following key terms are used throughout this study. They are defined here to clarify their specific meaning in relation to this study.

Principal components analysis: A mathematical procedure that converts a set of correlated variables into a reduced set of uncorrelated variables via orthogonal transformation.

Rasch measurement:: A psychometric technique used to create unidimensional, linear scales of measurement in the human sciences.

Reasoned risk-taking: Occurs when decisions are made by school principals that are not compliant with the *regulatory framework*.

Regulatory framework: The collection of policy and procedures documents disseminated to schools from the central office of the Department of Education and Training. Compliance with these instructional statements of policy is mandatory for all staff in government schools in Western Australia.

Structural equation modeling: A statistical technique for estimating causal relationships and testing hypothesised relationships between concepts in the model.

1.5 SIGNIFICANCE AND LIMITATIONS

1.5.1 Significance

This study explores the problem of risk-taking in decision-making by school principals. Principals can experience conflict in decision-making when a preferred response to a locally identified need is not compliant with centralised policy requirements. A review of the literature on risk-taking in decision-making revealed limited research in the context of public sector organisations, with the majority of research conducted in private business contexts. Investigation of the applicability of theories developed in the

literature was also more prolific in business contexts and in relation to higher education institutions than within public sector contexts. This study addresses this gap by applying these theories to risk-taking in decision-making within the public sector environment of public schools.

Further, the study involved the development of a theoretical model of risk-taking in decision-making applicable to this context. This study therefore adds to the body of knowledge available in the area of risk-taking in decision-making in public sector contexts. A model identifying factors that impact on principals' decision-making was developed and hypotheses related to it were tested. The relationship between principals' perceptions of corporate governance, their level of experience and the characteristics of stakeholders and reasoned risk-taking in decision-making is a new aspect to the decision-making literature that required further deliberation and study. Identification of these factors and exploration of the concepts underlying them opens new possibilities for further research on decision-making in educational environments.

The timing of the study follows implementation of significant changes to the structure of policy documents, their compilation into the regulatory framework and electronic dissemination to schools and also the broader community. It also follows a controversial incident that received high level media attention highlighting the risks involved in decision-making for principals. In the subsequent inquiry by the State Coroner (2002) a principal was found to have made decisions contrary to policy in the regulatory framework with the consequence of the death of a student. The Coroner's decision (State Coroner, 2002) did not find the principal negligent, as attention to the statutory requirement to promulgate policy and procedural requirements by the regulatory authority was insufficient to assure awareness and understanding of the policy. However, such incidents highlight the increasing focus on personal and professional risk for school principals who may be found negligent if they fail to meet system requirements (Starr, 2008).

This study also has practical significance for education in Western Australia as it:

- Provides feedback to the Department of Education and Training with regard to perception and utilisation of the regulatory framework by principals;
- Provides a focus to enable clarification of the alignment of the purpose of the regulatory framework to the Department's strategic direction, including the extent of devolution of authority to district offices and of local decision-making to schools;
- Indicates areas in which professional development of principals may assist in their use of the regulatory framework in decision-making in schools; and
- Indicates areas of risk management that need to be considered in developing appropriate requirements for accountability for devolved decision-making.

This research also provides a theoretical contribution through use of a methodology that combines psychometric and traditional measurement techniques. There are references in the literature to recent use of such combined techniques in educational contexts, but such studies are limited at present. This approach may provide a more rigorous technique than is possible using only one measurement approach, but it has not yet been adequately explored in the research literature. The sequential use of these analytic techniques and their usefulness in providing an improved measurement instrument require further investigation.

Rasch measurement has been used to analyse the data and create a robust measurement scale. This psychometric technique provides current world best practice in the creation of linear scales in the human sciences. A theoretical model of factors impacting on reasoned risk-taking in decision-making was developed and tested used Partial Least Squares (PLS) structural equation modeling. This analysis provides evidence of the effect of the concepts included in the model and consequently insight into governance structures, characteristics of schools and principals that influence decision-making in schools.

A further theoretical contribution relating to the problem of reverse coding in the conduct of Partial Least Squares (PLS) structural equation modeling is significant.

Resolution of a problem that emerged during the process of analysis of the data highlighted a gap in the research knowledge base. This research therefore provides a case study of the cause and solution of a reverse coding problem in PLS structural equation modeling that has not been previously considered in the literature.

1.5.2 Limitations of the Study

This study was restricted to government schools in Western Australia. With any research, the applicability of outcomes to other contexts must be considered. While the present study focused only on government schools in Western Australia, it is useful in providing a basis for further research in other school settings and sectors. The hypothesised model was found to provide an adequate explanation of the risk-taking in decision-making by government school principals and could be further tested in other school settings.

A range of philosophical perspectives were considered as part of the development of this thesis and a decision was taken that both modern and postmodern theoretical perspectives provided a valuable lens from which to explore the research questions. Traditionally, research is conducted from only one frame of reference but a mixed approach was selected as most appropriate for this study. This is a limitation in that the approach selected is only one of many possible frameworks that could have been used as a basis for the research. A different approach to the study may have yielded different results.

1.6 RESEARCH METHODOLOGY

1.6.1 The Research Paradigm

The philosophies of modernism and postmodernism each provide a useful approach to thinking about organisations. The modernist view has an impact in organisations where it is assumed that ultimate truths exist in relation to policy positions and their impact in a range of contexts. Organisational regulatory compliance is a component of corporate governance that provides a systematic approach to assuring uniformity and consistency across organisational business processes. The Organisation for Economic Co-operation and Development (OECD, 2000) defines regulation as “the diverse set of

instruments by which governments establish requirements for enterprises and citizens", including laws, formal and informal orders, and subordinate rules issued by all levels of government. Such a definition is modernist in that it is based on the positivist assumptions regarding the structure of society and organisations and their working.

The existence of governance mechanisms such as the regulatory framework is based on assumptions that are rational and empiricist. Principals of government schools are provided with guidance for their decision-making by centrally developed educational policy and procedures included on the regulatory framework. Policy writers within the central office work under the assumption that policies and procedures can be developed that will apply universally to all schools and circumstances. Such a view aligns with the position of Compte (Whiteley A, 2004; Bullock, Stallybrass & Trombley, 1988, p.789) and Durkheim (Whiteley A, 2004; Bullock, Stallybrass & Trombley, 1988, p.337, 821), where universal laws are invariant across societal contexts.

Postmodern thinkers have reacted against the modernist view to provide an alternative perspective of society and organisations that rejects the modernist meta-narrative and associated unitary vision of science and society (Calas & Smircich, 1999). Silcox (2003) adopted a postmodern constructionist perspective to interpret the impact of principal leadership on school renewal. More recently, Eacott (2009, p.2) argues that the concept of educational leadership needs "to move beyond modernist thinking and embrace the complexity of ever shifting cultural, social, historical and political relationships". Researchers in educational leadership are increasingly using complexity and chaos theory as a tool to provide greater understanding in dynamic educational environments (Gilstrap, 2005; Daniello, 2010). Whiteley, A (2003, p.6-7) pointed out that chaos theory "belongs to the natural sciences domain", but also suggested that it can provide a helpful metaphor for the study of human relations in the workplace. The philosophical position of postmodernism, and in particular complexity theory, provide a different lens that could be of great value to principals attempting to make decisions in a complex school environment.

The impact of modernism and postmodernism on corporate governance and decision-making is discussed in Chapter 2. In this study, complexity theory, which draws on both of these philosophical positions, will be utilised. Nicolaides (2010, p.4) indicates that in researching problems marked by complexity, such as learning environments, "conventional responses are not sufficient". The postmodern approach of complexity theory was used in developing the research model and in understanding organisational dynamics and specifically the issue of decision-making by principals in government schools.

1.6.2 Methods

This study develops a research model of risk-taking in decision-making by school principals and tests some associated hypotheses. The model, and the associated questionnaire to measure constructs composing it, were developed with reference to the literature and conclusions from a preliminary qualitative familiarisation study.

1.6.3 Data Collection

Preliminary data was collected through face-to-face interviews with principals, district directors, managers of district operations and managers/coordinators of student services in each of the 16 district education offices across Western Australia. In addition, interviews were conducted with key stakeholder groups including the State School Teachers' Union of WA, professional associations for primary and secondary school administrators and the parent and community representative body, the WA Council of State School Organisations. In conjunction with the literature review, this data has been used to develop the research model.

Measurement items were developed for each of the constructs included in the research model. Measurements in existing studies related to business environments were not transferable to an educational context but concepts included informed the development of the model. A questionnaire was developed to measure the constructs included in the research model. The questionnaire was piloted with a small sample of principals from both metropolitan and remote primary and secondary schools. The refined version of

the questionnaire was then used to collect confirmatory data to analyse the research model.

1.6.4 Analysis

A combination of Rasch and traditional statistical techniques, including structural equation modeling, were applied to test the measurement properties of the questionnaire and the hypothesised model. Analytic techniques utilised in this study were those deemed most likely to provide the strongest evidentiary base to support the validity of the theoretical model. Cavanagh and Romanoski (Waugh, 2005, p.67) point out that "although these techniques are based upon different psychometric traditions, each has utility in specific aspects of hypothesis testing and measurement".

The data analysis involved four procedures. Firstly, a preliminary statistical analysis of each of the items in the questionnaire including the demographic variables of interest was conducted using SPSS version 12 (2003). Following this, a Rasch analysis was conducted with RUMM version 2020 (2005) to explore the psychometric properties of the measurement instrument used to collect the data. Having established that the questionnaire provided a valid and reliable scale of measurement, an analysis of the model incorporating these constructs was conducted using exploratory factor analysis. Finally, the hypotheses were tested using structural equation modeling. The structural equation modeling was conducted using Partial Least Squares (PLS) version 3.0 (Chin, 2001).

Structural equation modeling and other path analysis techniques have been more frequently used in educational based research in recent years. Fidler (2001, p.54) comments that there are opportunities for greater use of such techniques in understanding schools and their effectiveness. This study combines structural equation modeling with Rasch analysis. Cavanagh and Romanoski (Waugh, 2005, p.68) contend that the Rasch methodology allows identification of measurement errors due to item or person misfit during scale construction, allowing the errors to be minimised prior to analysis of the model with traditional techniques. Structural equation modeling includes an assessment of the measurement model as a component of the analysis. However, the presence of errors of measurement and their influence on the

fit of the data to the model are only revealed after the fit statistics have been estimated. Cavanagh and Romanoski (Waugh, 2005) posit that the presence of such errors could prevent model confirmation. Following conduct of the Rasch analysis, items identified as demonstrating errors were removed from the analysis before undertaking the structural equation modeling analysis.

1.6.5 Sampling

The survey was sent to principals in a sample of 253 schools across the state. A stratified sample of schools was selected on the basis of district, geographical location, school type, and school size. The sample was selected to be representative across districts, geography, school type and size at a 95% confidence level. The maximum number of items used to measure a construct within the research model also needed to be considered in determining the sample size.

Principals indicated their consent to participate by completing and returning the questionnaire. To maintain complete confidentiality no identification coding was assigned to returned questionnaires. Principals were assured that they could be confident of absolute anonymity and confidentiality of responses. Some principals who originally declined, agreed to participate following communication with the researcher. They wanted clarification about aspects of the questions and to express their views about governance within the Department of Education and Training. These comments were considered separately from returned questionnaires.

The size of the sample was determined by the multivariate data analysis tools used to analyse the collected data and to test the hypotheses based on the research model. Partial Least Squares (PLS) based structural equation modeling was the preferred tool used in this study. This tool requires the sample of respondents to be ten times the maximum number of items to measure any construct within the model. This tool provided the advantage of allowing analysis of all paths simultaneously for each of the dependent variables included in the research model.

1.7 ETHICAL ISSUES

In 2005, the Director General of the Department of Education and Training approved access to the preliminary data collected from principals. Each of the stakeholder groups identified as having an interest in this study was contacted by letter to explain the objectives of the research and to outline the intended use of the data collected. A sample of these letters is included in Appendix 1.

Following receipt of ethics approval, each of the principals in the sample was contacted by letter to outline the intended use of the data collected as part of this new study, to explain the research objectives and to ascertain their willingness to have their data included. Principals who had been involved in the preliminary 2003 data collection were also sent a consent form to elicit permission for their previously collected data to be used for the current study. All principals were sent a copy of the questionnaire and requested to complete and return it if they agreed to be involved.

The research has been conducted in accordance with the *University's Code of Conduct for the Responsible Practice of Research*. In particular, anonymity and confidentiality has been assured and maintained throughout the research process. Confidentiality of responses is essential and the anonymity of the principals and other respondents has been respected and protected in the analysis and reporting of the study and following that in the retention of the records of the interviews and survey instruments.

The introductory letter to principals also offered participants and stakeholder groups a summary of the findings of the research at the conclusion of the research and submission of the thesis. The purpose of this was to seek reciprocity with the participants both in terms of sharing and trust in listening to and interpreting their responses but also through the mutuality that they have a stake in the outcomes of the study. This acknowledgement has an ethical dimension of inclusivity of participants in the outcomes of the study and may also have resulted in an increased response rate. As indicated in the discussion of significance, this study may potentially lead to action by the Department and further developments in policy related to the regulatory

framework. Participants are aware of a range of potential uses for published research and will, to differing degrees, become involved in this process. Provision of results to stakeholders and participants may therefore provide catalytic and tactical authenticity to the study through the stimulation of action and involvement by the principals and the provision of a level of empowerment to critique the regulatory framework as they currently perceive it.

All data collected as part of this study will be stored for a minimum of five years consistent with the joint *NHMRC/AVCC Statement and Guidelines on Research Practice*. The preliminary interview data used to develop the research model is the property of the WA Department of Education and Training and all of this data will continue to be securely stored within the Evaluation Branch at the Department of Education and Training as per the requirements of the WA State Government Records policy.

1.8 OVERVIEW OF THE THESIS

Following this introductory chapter, Chapter Two presents a literature review focusing on decision-making and risk. The key concepts relating to the thesis are identified and relevant literature associated with these concepts is reviewed. The literature review provides a foundation for the study by reviewing and discussing the relevant theories that have been developed regarding reasoned risk-taking in decision-making. Agency and prospect theory, expected utility theory and behavioural perspectives are explored. The literature review examines research on the effect of governance mechanisms, the experience of management and stakeholder characteristics within business contexts and their relevance and applicability to this study. The literature on school leadership and school renewal and their links to risk-taking and decision-making is also addressed.

Chapter Two then presents a philosophical and theoretical context for the study, including the historical background of modernism and postmodernism and the influence of these philosophical paradigms on the development of public policy and of compliance models of corporate governance on state public service organisations. The

applicability of complexity theory is investigated as a useful lens to understand reasoned risk-taking in decision-making in public sector environments and particularly schools.

Chapter Three follows with a presentation of the research design for the study, including a discussion of methods, the development of the research model and the constructs included within it. Chapter Three then proceeds to develop the hypotheses of the research study and describes the process of the development of the questionnaire. It concludes with a description of the sample selection.

The methods of the study are delineated in greater detail in Chapters Four and Five. In Chapter Four this includes an account of the pilot study of the questionnaire, the feedback obtained and the subsequent modifications. This chapter then details the first three stages of the quantitative analysis and the results. Firstly, a preliminary statistical analysis of the data using SPSS version 12 (2003). Secondly, a Rasch analysis to explore the psychometric properties of the measurement instrument conducted with RUMM version 2020 (2005). Items identified by the Rasch analysis as misfitting or illogical were removed at this stage. Following this, an exploratory factor analysis was undertaken for each of the constructs in the hypothesised model using SPSS version 12 (2003). Further items were removed at this stage where they did not load sufficiently onto the constructs they were developed to measure.

Finally, the hypothesised model was analysed using Partial Least Squares (PLS) structural equation modeling version 3.0 (Chin, 2001). This component of the analysis is detailed in Chapter Five. A further four items were removed due to low reliability as determined in the assessment of the measurement model. One of these items was subsequently retained as its removal created a problem with reverse coding and impacted on the integrity of the construct it contributed to. An analysis including two additional interaction constructs was undertaken to test the hypothesis that experience has a moderating effect on governance mechanism. Multigroup modeling was also conducted to determine whether the model showed differences in applicability when

divided into groups based on measures of experience. This provided an alternative method to examine the moderating effect of experience.

The findings of the study, their implications and resulting conclusions are presented and discussed in Chapter Six. Results of the analysis showed support for the hypothesised model. The implications of the findings are considered and an assessment is made of the contribution the study has made to the knowledge of risk-taking in decision-making and its potential use by the Department and schools. Conclusions are made and recommendations offered for further possible research to build upon the outcomes of this study and to counter some of its limitations.

A copy of the consent form, correspondence, and the pilot and final versions of the questionnaire can be found in the Appendices. A list of the Appendices and the content of each chapter can be found in the Table of Contents.

1.9 SUMMARY

Chapter One has described the background, context and motivation for the study, and provided an overview of the research objectives, method, and key questions. The potential significance of the study and its limitations were presented along with a discussion of ethical issues and practice in its conduct. The research methodology was delineated and the chapter concluded with an overview of the structure of the remainder of the thesis, including the general content of the chapters.

CHAPTER TWO[1]

2 LITERATURE REVIEW

2.1 INTRODUCTION

Chapter two reviews literature related to reasoned risk-taking in decision-making and theories that have been developed to explore their relationship with governance mechanisms, experience and stakeholder characteristics. The literature review also includes an examination of work concerning school leadership and considers how this literature relates to the more general case of leaders in business contexts.

Commencing with an examination of a range of theories and models in relation to reasoned risk-taking in decision-making, the literature review encompasses agency and stewardship theory, and utility and prospect theory. The literature review then moves to explore how these theories, combined with behavioural perspectives, have been used to develop theories of risk-taking that are impacted by governance mechanisms, experience of management and stakeholder characteristics. Within the review of the impact of experience, theories of school leadership and devolution of decision-making are explored. This component of the review is inclusive of work done in business contexts but focuses primarily on the educational leadership literature.

The philosophies of modernism and postmodernism provide a useful approach to thinking about organisations. The final section of this chapter discusses and contrasts each of these philosophical positions. The particular postmodern approach to complexity theory is described. Complexity theory recognises the contribution of mathematical models to the understanding of complex social systems, but the associated epistemology is postmodern. The chapter proceeds to consider how each

[1] Findings from this chapter have been presented and published by the researcher in:

'Non-compliance by school principals: The effects of experience, stakeholder characteristics and governance mechanisms of reasoned risk-taking in decision-making', *Proceedings of the Australasian Association for Research in Education,* 1-4 December 2008, Brisbane, Australia.

philosophical position can provide insight into public sector organisations and the approach of complexity is considered in relation to the issue of decision-making by principals in government schools. The issues raised in this chapter are used in development of the research model and subsequently in the discussion of the results.

2.2 THEORIES OF STRATEGIC MANAGEMENT

2.2.1 Agency Theory

The terms ‘agents’ and ‘principals’ are frequently used in the agency theory literature (Jensen & Meckling, 1976; Eisenhardt, 1989). However, for the discussion in this thesis, the terms ‘managers’ and ‘shareholders’ will be used throughout. This is to avoid confusion in meaning as in this study, school principals are the ‘agents’ or ‘managers’ of their firm, the school, and the ‘principals’ or ‘shareholders’ are the State government Ministers for Education and Training and hierarchy of the public sector within the central office of the Department of Education and Training. These shareholders engage principals to manage schools and achieve a range of educational outcomes for students.

A number of studies of risk-taking, decision-making and the influence of corporate governance have been based on the tenets of agency theory (Eisenhardt, 1989; Hoskisson et al., 1999, p.420). Agency theory posits that due to separation of ownership and control in organisations, there are often conflicting interests between shareholders and managers (Jensen & Meckling, 1976; Fama & Jensen, 1983; Jensen, 1986, p.323; Rumelt, Schendel & Teece, 1991, p.15). In providing an analysis of these conflicting relationships, agency theory assumes that human beings are rational, self-interested and opportunistic and therefore managers will seek to maximise their own interests even at the expense of the shareholders (Fama & Jensen, 1983; Hoskisson & Turk, 1990 p.462; Hoskisson et al., 1999, pp.434, 435). Eisenhardt (1989, p.58-59) includes the problem of risk sharing in the domain of agency theory, as the differing goals of shareholders and managers may arise as they have different attitudes toward risk. Their willingness to accept risk can then affect the choice of action or contract by the managers.

Focused at the level of the firm or organisation as opposed to an industry level emphasis (Jensen & Meckling, 1976; Fama 1980; Hoskisson & Hitt, 1990; Hoskisson et al., 1999, p.433), agency theory has developed in two branches, with the corporate control branch of the agency literature being the most relevant to strategic management (Eisenhardt, 1989; Rumelt, Schendel & Teece, 1991, p.15). The corporate control agency literature is primarily concerned with the overall governance structure of the firm; including theories related to debt, leverage, diversification and takeovers. A key focus has been conflicts of interest between managers and shareholders in organisations where there is substantial free cash flow (Jensen 1986; Eisenhardt, 1989; Hoskisson & Turk 1990; Hoskisson & Hitt, 1990). This focus has greater relevance in a private business environment than in the context of the public sector and schools.

Fama and Jensen (1983) also consider agency problems caused by separation of decision and risk bearing functions. They hypothesise that separation of risk bearing from decision management leads to decision systems within firms that separate decision management from decision control. In their analysis, decision management incorporates the initiation and implementation of decisions, and decision control includes the ratification and monitoring of these decisions (Fama & Jensen, 1983, p.303-304). Their in-depth analysis of factors within different firm structures includes a range of private, profit and non-profit structures. Combination or separation of the functions of decision management and decision control may be the more efficient strategy dependent on the type of firm structure. Whilst public sector organisations are not included in this analysis, the decision hierarchies described for complex organisations, where organisational rules are in place to monitor and constrain the decision behaviour of agents, aligns closely with what is observed in the public sector (Fama & Jensen, 1983, p.310).

Whilst school principals have some delegated authority to make decisions regarding management of their school and achievement of the agreed outcomes, there is a corporate governance mechanism in place, which includes the regulatory framework, to limit and control such decisions to ensure alignment with the interests and requirements

of the stakeholders. Thus, in the terms of Fama and Jensen's (1983) hypotheses, the principals are responsible for decision management but not the decision control. This is due to the regulatory framework which provides a decision hierarchy against which decisions are ratified and against which principals' performance can be monitored. There is a gap in the literature in regard to applying this theory to public sector organisations. Application of agency theory to this instance would predict that school principals will seek to make management decisions that cater to the needs of their individual school and community as opposed to centrally developed policies and procedures as defined in the regulatory framework. This would occur where principals perceive there to be conflict between the desired outcomes for their school and the regulatory requirements. This study will explore this prediction and provide some evidence to address whether the theory is applicable in the public sector context.

2.2.2 Stewardship Theory

In a deviation from agency theory, Davis, Schoorman and Donaldson (1997) suggest that managers are stewards of the firm's assets. They argue that managers are not motivated by individualistic, opportunistic and self-serving goals, but rather act to achieve greater utility in collective organisational behaviour and thus seek to attain the goals of the organisation. It is the underlying assumptions about the nature of man; the motivations of managers; their identification with and commitment to the goals of the organisation; and the use of power that are the key differences between agency and stewardship theories. According to Hoskisson et al. (1999, p.446) stewardship theory is not in juxtaposition to agency theory; rather its sociological and psychological perspective helps explain some managerial behaviour in addition to agency theory.

Stewardship theory also considers the impact of the organisational and governance structures on the actions of the steward. Here stewardship is facilitated in organisations with structures that facilitate and empower managers by giving them authority and discretion in decision-making. Organisational and governance structures that monitor and control managers are not considered appropriate under the assumptions of behaviour underpinning this model, as they would diminish the

motivation and capacity of the steward manager to achieve collective goals (Davis, Schoorman & Donaldson, 1997, p.25).

This theoretical position raises a dilemma in the case of school principal managers under the control of the regulatory framework. The goals and outcomes of schooling for students are likely to be well aligned for both managers and shareholders in this example. Bennett's (2001) discussion of school effectiveness supports this view. Stewardship theory would therefore predict that empowering managers to be responsible for decision-making would be most effective. In contrast, a highly controlled governance structure that constrains decision-making by school principals would be predicted to cause frustration in these managers, causing them to feel disenfranchised and more inclined to act as an agent than a steward. Feelings of empowerment or disenfranchisement are closely linked to perceptions of risk in decision-making.

2.2.3 Expected Utility Theory and Prospect Theory

An important consideration for managers in making decisions is the anticipated risk associated with each possible decision or course of action. Traditional models of risk have been probabilistic (Bowman, 1980; Yang & Qui, 2005, p.792; Taleb, 2007) and studies of risk-taking appear to have focused largely on the relationship of these defined risks and returns or profits within a given firm. Within this context, "risk is the concept that captures the uncertainty, or more particularly, the probability distribution, associated with the outcomes of resource commitments" (Bowman, 1980, p.18). Expected Utility Theory has been used for many decades to model decision-making under uncertainty. Godo and Zapico (2001, p.319) refer to Von Newmann and Morgenstern's use of this model in 1944 and it has been utilised by many researchers since this time. Expected utility theory provides a rational approach to making decisions involving risk that is described by and analysed through use of probability distributions and hypothesised functions to measure risk and return.

Traditionally, in business contexts, such decision-making within expected utility theory is limited to choices amongst a set of financial alternatives and risk is defined as

outcomes with uncertain payoffs (Bell, 1995, p.23). In comparison, within agency theory risk goes beyond outcome uncertainty to include implications of the risk/reward trade-offs on the firm arising from decisions of managers (Eisenhardt ,1989, p.65). Vlek and Stallen (1980, p.276, 277) propose an even broader view of risk and discuss a range of possible definitions of risk that are inclusive of industrial and societal risks. Such models are more closely aligned with the business of schools where the payoffs are outcomes for students rather than financial profits. For this reason they are relevant to this study.

Within both utility and agency theory there is an assumption of consistent choice behaviour across risk related problems. These traditional theories of decision-making are based on the assumption that "human beings behave in an entirely rational and logical manner" and "aim to maximize satisfaction by choosing the alternative with the greatest utility value" (Cooke & Slack, 1991, p.43; Dastani, Hulstijn & Van Der Torre, 2005, p.762). These assumptions are unlikely to hold true in reality as individual decision-makers' personal values will both consciously and unconsciously affect the choice of alternatives (Cooke & Slack 1991, p.44-53; Van Der Torre & Weydert, 2001, p.285; Taleb, 2007). Individual characteristics of the managers who are making decisions, and the context of the decision-making environment and of the particular problem to be solved, are not considered in either utility or agency theory. More recent models of decision-making incorporate the individual decision-maker's attitude toward risk in an extension of the classical expected utility model (Van Der Torre & Weydert, 2001; Godo & Zapico, 2001; Yang & Qui, 2005; Dastani, Hulstijn & Van Der Torre, 2005).

In response to limitations of utility theory in describing decision-making in circumstances where there is risk, Kahneman and Tversky (1979) developed an alternative model called prospect theory. In this theory the prospect of a gain or a loss impacts on the decision-makers' tendency to take a risk in selecting a choice of action. Kahneman and Tversky (1979, p.265; Taleb, 2007, p.77, 81) found that decision-makers tend to overweight outcomes that are considered almost certain, relative to those that are probable and are more sensitive to losses than to gains. These results contradict the intuitive notion that an almost certain outcome would be desirable to

decision-makers. The results of their study showed that decision-makers were more inclined to be risk averse in choices where there were sure gains, such as when they were protecting an already realised profit from a minimal potential loss; and risk seeking in choices involving sure losses where there is a very small probability of a substantial gain, such as when you purchase a lottery ticket. Although there is a dearth of research using prospect theory in the public sector, it should be appropriate to use in the context of school decision-making. The allocation of decision weights that allow for the observed behavioural effects is more relevant in this context than assigning the standard probabilities of occurrence as determined by decision trees in utility theory (Kahneman & Tversky, 1979).

Taleb (2007) is also critical of traditional probability based models. He argues that Gaussian models and traditional probability theory do not allow for random or non-random but unlikely events that occur in social and economic systems. Taleb (2007, pp.253-273) prefers the use of Mandelbrotian fractal models (Mandelbrot, 1982). Both this and the Kahneman and Tversky (1979) approach are considered relevant to this study because they recognise the complexity of modeling dynamic social systems.

2.2.4 Limitations of traditional theories of decision-making

Arising from the theories described above have been a range of theories and models that build on the concepts of agency, utility and prospect theory. These more recent approaches seek to address the identified limitations of earlier models in adequately describing the observed behaviour of decision-makers under conditions of risk. One example is a model of strategic risk-taking that accounted for environmental, industrial, organisational, individual and problem variables (Baird & Thomas, 1985). Baird and Thomas hypothesised that these external and internal variables impacted on the decision-maker and their assessment of risk. More recently, Minor (2004, p.41) argued that contextual factors, including political, academic, financial, social, cultural and situational circumstances, influence decision-making environments and the decisions made. Managers take risks, but the decision-making processes used may be quite different from the classical processes of utility theory where choices are made from alternative outcomes with defined probability distributions (March & Shapira, 1987;

Dastani, Hulstijn & Van Der Torre, 2005; Yang & Qui, 2005). March and Shapira (1987) concluded that managers are insensitive to estimates of the probabilities of possible outcomes due to focus on critical performance targets and consequently decision-making processes were significantly affected. Individuals may tend to ignore possible events that are very unlikely or remote, regardless of their consequences and instead tend to focus on only a few of the possible outcomes (Kahneman & Tversky, 1979; March & Shapira, 1987). These findings have significant implications for decision-making and the range of outcomes possible.

Papers by Hambrick and Mason (1984) and Wiseman and Gomez-Meija (1998) provide a more comprehensive view of managerial risk-taking that is impacted by the decision-makers' knowledge and values or view of the situation as positive or negative. They provide theories of filtering and problem framing respectively to provide an explanation of the decision-maker focus on restricted outcome choices. Taleb (2007) takes a very different perspective of traditional probability models, arguing that focusing on known probabilities can negatively impact on decision-making as it blinds the decision-maker to previously unknown possibilities, that he terms "black swans".

Physiological and environmental constraints also potentially limit the full application of utility theory. The neurological capacity of human decision-makers restricts possible outcomes choices. Williamson (1975, pp.22-23) postulates that where uncertainty or complexity are present in decision-making the limits of "bounded rationality" are reached and it is not possible to fully specify all possible actions or outcomes for a problem. Bounded rationality was described by Simon (1957, p.198; Child, 1997, p.52) as "the capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required". In terms of probability theory, this limitation means that human decision-makers may not have the capacity to generate complete decision trees that would allow consideration of every possible action or decision. A second limitation on decision-making that restricts the capacity to generate all possible solutions required by utility theory is due to the unpredictability and complexity of the decision-making environment (Child, 1997; Taleb, 2007). As a consequence, school decision-makers simply ignore some of the data and use heuristic thinking (Klein & Weiss, 2007, p.266).

In addition to biological restrictions on the capacity of decision-makers, there are also environmental, situational and personal factors that impact on the choice of decision-making strategy and the possible outcomes considered. Drucker (2001, p.3) refers to the "boundary conditions" that need to be considered by decision-makers in making judgements about level of risk and coming to an effective decision. Goodwin and Wright (2004, p.23) put forward six factors that they consider key to how people make decisions. They include:

1. *the time available to make the decision;*
2. *the effort that a given strategy will involve;*
3. *the decision-maker's knowledge about the environment;*
4. *the importance of making an accurate decision;*
5. *whether or not the decision-maker has to justify his or her choice to others; and*
6. *a desire to minimize conflict.*

More recently, Soane and Chmiel (2005) examined how personality factors, perception of risk, problem framing, emotions and cost-benefit considerations impact upon consistency of decision-making. Based on consideration of a combination of these factors, a decision strategy is selected. This may involve a trade-off between factors such as effort and accuracy, a requirement to select a strategy and outcome that can be justified publicly, or a preference for a pragmatic approach. Such trade-offs are common in the context of decision-making in schools. These limitations have implications for how decision-makers, such as principals, make judgements and the strategies that they employ to assist them in the process.

The types of risks, and responses to decision-making scenarios in schools, do not lend themselves readily to analysis with expected utility theory or prospect theory. Successful outcomes are most frequently related to the well-being of a particular student or group of students or other stakeholders such as teachers, parents or community members. Such outcomes are difficult to measure and very difficult to quantify as distinct from profit and loss in a business sense. Thus determination of probabilities for risks or outcomes is not feasible and calculation of weights for use in

prospect theory would also be problematic. The assumption of consistent choice within utility and agency theories is also unlikely to hold true in the situation of decision-making in schools. Consistent with Cooke and Slack (1991, p.44-53) the individual characteristics and personal values of each principal both consciously and unconsciously affects the decision-making process. The next part of the literature review considers models and strategies that have been developed or observed to be used to assist in decision-making in complex environments.

2.2.5 Models and Strategies for Decision-Making

Within the education environment, including schools, consideration of risk has become increasingly complex (Starr, 2008). Fullan (1993, p.19) discusses the complexity of the processes of decision-making for educational change, with unpredictable and unplanned factors being inevitable and unable to be considered in determining a solution decision. He refers to Senge's (1990, p.365) concept of "dynamic complexity where cause and effect are not close in time and space and obvious interventions do not produce expected outcomes". The complexity of systems and situations in which decisions are made and the concept of limited rationality in being able to respond with limited knowledge are also acknowledged by Cooke and Slack (1991, p.44) who refer to "satisficing" as an approach that accounts for the limitations of the decision-making context. Based on assumptions that acknowledge this dynamic and complex process for decision-making, Hoy and Miskel (2005) suggest that many school administrators utilise satisficing as a decision-making strategy. This is a pragmatic approach to decision-making that is aimed at finding a satisfactory solution rather than the best one. Within this simplified approach to decision-making, complexities are ignored and only limited alternatives perceived as most important to the decision-maker are considered (Hoy & Miskel, 2005, pp.300-302; Klein & Weiss, 2007, p.266). Within such an approach decisions are not necessarily fixed and choices may change as time passes (Goodwin & Wright, 2004, pp.20-21). Etzioni (2001, p.57) lists "flexibility, caution and the capacity to proceed with partial knowledge or reverse a decision" as essential qualities of decision-making. The pragmatic approach of satisficing is able to incorporate these qualities. This is an important component in the complex situations within the education context as situations can change and the importance of key factors will change as a consequence. Drucker (2001, p.10) indicates that "the most common

cause of failure in a decision lies not in its being wrong initially. Rather, it is a subsequent shift in the goals which makes the prior right decision inappropriate." The capacity to adapt decisions and self-regulate to identify and correct mistakes is an important metacognitive and reflective process that allows for more effective decision-making (Klein & Weiss, 2007, p.266). Such reflective strategies may also be important in ameliorating risk, when principals are making decisions in complex educational settings.

Another model that simplifies the decision-making process is the incremental model described by Hoy and Miskel (2005). This model reduces the complexity by disregarding alternatives that are not within a confined range of interest. The model requires the decision-maker to gradually come to a decision through a series of incremental steps. It is "a method of successive limited comparisons" where a small and limited set of alternatives are considered by successively comparing their consequences (Hoy & Miskel, 2005, p.312). Etzioni (2001, p.50) describes this approach as "the science of muddling through". Etzioni (2001, p.53) also describes a "mixed-scanning model" that is a similar pragmatic approach to decision-making that has been long utilised in medical environments. This model incorporates aspects of the incremental model to reduce the complexity and uncertainty involved in decision-making. Within this approach traditionally, a doctor would make a decision and give a prognosis or initiate a treatment based on observed symptoms of the patient. They would then observe the outcome of the decision and make incremental adjustments by suggesting alternative diagnoses or trying other treatments, until a solution was reached. Eraut (1999, p.121) indicates that this approach to decision-making is now being advocated in the field of education in the United Kingdom. However, he argues that even though it provides an analytic reasoning approach it has practical difficulties when applied in educational contexts due to limitations on the amount and quality of evidence that is available or can be gathered on which to base the decisions (Eraut, 1999, pp.120-121).

2.3 REASONED RISK-TAKING IN DECISION-MAKING

The relationship of reasoned risk-taking to governance has been studied in a range of business contexts. Carpenter, Pollock and Leary (2003); Wiseman and Gomez-Meija (1998) and Wiseman, Gomez-Mejia and Fugate (2000) have tested models of reasoned risk-taking and its relationship to governance mechanisms. Within these studies agency and behavioural perspectives have been used to develop theories of risk-taking where the nature of risk-taking is a consequence of governance mechanisms and stakeholder characteristics including the experience of management. These studies and their limitations are now discussed.

As past research in this area had focused primarily on the relationship between governance mechanisms and firm performance, Carpenter, Pollock and Leary (2003) sought to expand this to examine the relationship between governance and risky strategies taking into account the role of key stakeholders in affecting those strategies. The thesis that reasoned risk-taking is enhanced with greater experience of principals and agents was limited by narrowness of the definitions of both risk-taking and of the calculated ratio to measure degree of international expansion. However, the study contributed to demonstrating the critical role of boards and management, as a component of corporate governance, on strategies involving reasoned risk-taking and that the risk attitudes and experience of individual principals and agents can influence reasoned risk-taking strategies of firms.

Within the perspective of agency theory, corporate governance mechanisms such as stockholders, board members and ownership structure have been shown to influence risk-taking by managers and thereby increase performance and shareholder value (Eisenhardt, 1989). Sitkin and Pablo (1992) point to a limitation of studies using prospect theory due to contradictory findings when an individual's prior risk-taking behaviour is used to predict future risk behaviour. Whilst use in prediction has limitations, previous behaviour and experience are significant factors in relation to risk-taking. Carpenter, Pollock and Leary (2003) found that risk-taking was more likely where the stakeholders and management had relevant experience and Peters (1987) asserts that experimentation and risk-taking are essential not only to organisational development but also its survival. The importance of risk-taking to organisational

governance and decision-making has led to the development of models to assist in understanding and explaining behaviour of managers and stakeholders.

2.3.1 A Behavioural Model of Risk-Taking

Wiseman and Gomez-Meija (1998) constructed a behavioural model of risk-taking by managers that built on agency theory (Rumelt, Schendel & Teece, 1991, p.15; Hoskisson et al. 1999, p.435) and prospect theory (Kahneman & Tversky, 1979). Here, risk-taking behaviour is explained through internal corporate governance and problem framing. They argue that models relying on governance structure alone are inadequate and that inclusion of problem framing, as suggested by prospect theory where aspects of the decision-making situation are considered, provides a more comprehensive view of managerial risk-taking. In their analysis, problem framing refers to whether a situation is presented to a decision-maker in a positive or negative manner. The framing of a situation by the decision-maker as an opportunity or a problem is also posited to impact on the likelihood of risk-taking behaviour by Taleb (2007). The work of Wiseman and Gomez-Meija (1998) is further supported by Gonzalez et al.'s (2005) findings, which showed that the cognitive effort required in making a decision was impacted by the framing of the problem. Specifically, Gonzalez et al. (2005) found that a trade-off occurred between the cognitive effort required to calculate the expected value of the decision alternatives and the affective value of the alternatives. This had the effect that positively framed problems elicited risk averse responses whereas decision-makers tended to be risk-seeking when dealing with negatively framed problems. Related to the framing of the problem, the magnitude of the potential consequences has also been found to impact on risk-taking (Etchart-Vincent, 2004; Taleb, 2007). These findings have implications for decision-making by principals in circumstances where there are potential negative outcomes and high risk.

Tamura (2005) extends the Kahneman-Tversky model of prospect theory to develop a consensus formation model that he argues has greater applicability in a public sector environment where multi-agent conflicting decision-makers are required to reach ethical consensus. Previously, Sitkin and Pablo (1992) have argued that contradictory findings have arisen as a consequence of the use of over simplified models to explain the

influence of individual, organisational and problem-related factors on risk-taking behaviour. They posit that these factors only have indirect influence on decision-making via the mediating mechanisms of propensities and risk perceptions. The individual's personal tendency regarding their willingness to take risks (propensity) and the decision-maker's individual assessment of the inherent risk in a situation (risk perception) have been confirmed as significant factors in subsequent studies. Franken and Muris (2004) found that behavioural decision-making appeared to be correlated to the self-reported decision-making style of the individual and risk propensity has also been shown to be influenced by the age, sex and personality of the decision-maker (Child, 1997, p.51; Nicholson et al., 2005). Studies such as these are aligned to a more behavioural or cognitive perspective of strategic decision-making that accounts for the propensity and risk perception of individual decision-makers (Huff, 1990; Barr, Stimpert & Huff, 1992; Hodgkinson & Maule, 2002).

Much of the literature looking at models of strategic decision-making and risk-taking behaviour relates to studies that have been conducted within the context of business environments. For example, Carpenter, Pollock and Leary (2003) provided some evidence of the critical role of boards and management, as a component of corporate governance, on strategies involving reasoned risk-taking and that the risk attitudes and experience of individual principals and agents can influence reasoned risk-taking strategies of firms. There has been minimal application of these theories to the public sector environment, specifically the context of reasoned risk-taking by principals in government schools. Decision-making in the public sector is controlled by the governance mechanism of regulatory frameworks that include legislation, regulations and departmental policies. Reasoned risk-taking occurs when decisions are made that are not compliant with the regulatory framework. This study proposes the use of agency (Rumelt, Schendel & Teece, 1991, p.15; Hoskisson et al., 1999, p. 435) and behavioural (Wiseman & Gomez-Mejia, 1998) perspectives to determine whether the reasoned risk-taking by school principals is a consequence of their perceptions of the governance mechanism of the regulatory framework, the experience of principals and the characteristics of key stakeholders within the school community. It is therefore useful to look at the literature directly related to leadership and decision-making in schools.

2.4 LEADERSHIP AND DECISION-MAKING IN SCHOOLS

A significant body of literature has been developed over many years in regard to leadership in schools, the characteristics of principals and their behaviours, that contribute to effective leadership and facilitate innovation and change in schools. Harris (2001, p.16) asserts that research in this area has reinforced the importance of leadership by principals in achieving change in schools. In 1967, Fiedler's theory of leadership effectiveness used four scales or dimensions in research on a range of jobs and professions. He defined the dimension of "decision verifiability" as "the degree to which the "correctness" of the solutions or decisions typically encountered in a job can generally be demonstrated by appeal to authority or authoritative source (Fiedler, 1967, p.28). Using Fiedler's scale, principals' "decision verifiability" is high due to provision of the regulatory framework. However, "solution specificity", which is "the degree to which there is more than one correct solution" (Fiedler, 1967, p.28), would rate low for principals as they frequently deal with decisions involving human relations that have many possible solutions. The complexity of decision-making in schools and the requirement for verifiable solutions has not diminished since this time.

The role of school leadership, while officially determined by legislation and policies, is a complex social activity (Eacott, 2009, p.3) and the willingness to take risks is one of the characteristics identified by Mendez-Morse (1992) as being common to successful leaders of educational change. In regard to decision-making, Silcox (2003, p.10) contrasts management and leadership decision-making for school renewal, with management requiring low risk decisions based on established procedures and leadership requiring higher risk decisions to find solutions in uncertain situations. Fullan (1993, p.26-27) and Caldwell (2006, p.193) concur that educational leadership entails experimentation and risk-taking. Similarly, Dalton, Fawcett and West-Burnham (2001) provide eleven case studies of best practice of creativity in schools. They conclude that centralised policy cannot lead to significant school improvement. Rather, school improvement relies on innovative decision-making within schools (Dalton, Fawcett & West-Burnham, 2001, pp.142-143). However, Dalton and Read (2001, pp.62-63) indicate that for sustainable change to occur in schools, the teachers and school leaders must feel confident to take risks in their decision-making.

The educational literature makes a clear distinction between school reform and school renewal based on the concept of locus of control in decision-making (Glickman, 1992). Silcox (2003, p.12) makes the distinction that "school reform refers to top-down, system initiated processes" whereas "school renewal is a bottom-up, school community driven approach to educational improvement". He argues that the principal's perception of their capacity to bring about change and achieve desired outcomes is critical to their decision whether to become engaged in school renewal. Similarly, Caldwell (2006, p.129) found that principals in Victorian schools preferred decentralised decision-making and were more highly committed with higher levels of job satisfaction in self-managed schools. This encompassed circumstances where they had a significant amount of authority, even if workload, paperwork and responsibility were increased. He concluded that principals will "actively seek and accept a higher level of authority and responsibility as the school moves closer to autonomy" (Caldwell, 2006, p.193). Consistent with stewardship theory where the goals of organisations and their managers are aligned, such findings suggest that there would be organisational advantages to providing more autonomous decision-making environments in schools.

2.5 EXPERIENCE AND GOVERNANCE AS DETERMINANTS OF RISK-TAKING BEHAVIOUR

In sections 2.2.5 and 2.3 of the literature review, behavioural models of risk-taking in decision-making considered how strategic decisions are impacted by the idiosyncrasies of individual decision-makers (Kahneman & Tversky, 1979; Hambrick & Mason, 1984; Cooke & Slack, 1991; Child, 1997; and Nicholson et al., 2005). These idiosyncrasies include the decision-maker's knowledge and values, both of which are influenced by the previous experience of the individual. Hambrick and Mason (1984) developed a model of strategic choice in which the decision-maker's cognitive base and values are filtered through their perceptions of the decision-making situation. Individuals search through their past experiences to try to recall similar situations, but individual values and selective perception of past experiences can result in a subjective assessment of the decision choices (Cooke & Slack, 1991, pp.52-53; Hoy & Miskel, 2005; Klein & Weiss, 2007). Petrakis (2005) considered the relationship of individual risk propensity, risk perception and the firm's risk, and factors that determine entrepreneurial behaviour. These studies provide support for the hypothesis that principals' perceptions of the

governance mechanism of the regulatory framework and the individual experience of principals will impact on their propensity to take risks in decision-making.

In the context of this study, the principal's perception of the governance mechanism of the regulatory framework frames the decision-making process. The experience of principals provides a knowledge base for decision-making that influences individual risk propensity and perception. Soane and Chmiel (2005, p.1789) conclude from their study that "people engage with risk knowingly because they are seeking particular benefits associated with risk, rather than taking risk without awareness that they are doing so". If risk-taking is a deliberate strategy on the part of principals, it follows that their perceptions and experience should influence their decision-making.

In the previous discussion it was noted that the decision-maker's consideration of risk is impacted by individual subjective assessments of the decision context that stem in part from differing levels of experience (Wiseman, Gomez-Mejia & Fugate, 2000). One aspect of experience is the complexity of knowledge held and the capacity to use it in constructing representations to solve problems (Spillane & Miele, 2007). Spillane and Miele argue that this capacity to utilise knowledge increases with expertise (2007, p.54). However, the actual knowledge held by an individual, is linked to the perception individual decision-makers have regarding their level of expertise (Taleb, 2007, pp.151-156). So actual experience and perceptions both impact on considerations of risk.

Sitkin and Pablo (1992) posit in their paper that risk propensity dominates both actual and perceived characteristics of any situation in which decisions involving risk are made. Sitkin and Pablo (1992) and Wiseman and Gomez-Meija (1998) propose that the greater a manager's experience and past success with dealing with an action, the less uncertainty that manager will have regarding the likely outcome of taking the action, and the more reasonable the risk will seem. The converse is also supported by Boyatzis (1982) and the study by MacCrimmon and Wehrung (1990, p.433) that found that "success, when it had a significant relationship with risk propensity, was always positively associated with risk taking". Wiseman, Gomez-Mejia and Fugate (2000) indicate that the relationship between experience and success arises because differing

levels of experience can effect the expectations regarding the magnitude and the probability of loss associated with taking a particular risk. March and Shapira (1987) explained this as perceptions being driven by expectation, such that the probability of success is increased and risk decreased by the factor of experience in decision-making.

In the context of schools, experienced principals are likely to have had the opportunity to be involved in decision-making situations in the past that may reduce their uncertainty and inform their future decision-making. The experiences and knowledge are likely to be broader and able to be used selectively to define problems and craft solutions (Spillane & Miele, 2007, pp.54-68). Experienced principals would therefore be expected to have greater propensity to engage in risk due to reduced uncertainty and a perception of risk based on greater knowledge of similar situations. This tendency could also be enhanced if they had previously had success as a consequence of their risk-taking. Conversely, new and acting principals, who have limited experience, would be expected to be more likely to refer to and comply with the regulatory framework as a guide to their decision-making in situations of risk.

2.5.1 Autonomy and Control in Decision-making

Sitkin and Pablo (1992) argue that decision-makers' perceptions of their leaders' preferences regarding risk, influences their behaviour such that it is consistent with these perceptions. Managers are pressured to compromise their decisions to align with the preferences of the organisation and gain approval from others in the hierarchy (Cooke & Slack, 1991, p.64; Child, 1997, p.48). These views support previous studies that suggest that common training, experience, and feedback received by decision-makers tend to minimise risk-taking through deviation from company policy (Libby & Fishburn, 1977, p.287). Within a behavioural model of risk-taking, Wiseman and Gomez-Meija (1998) argue that the managers who feel more certain regarding the likely outcome of taking an action will find risk-taking more reasonable. Vlek and Stallen (1980, p.287) refer to this as "perceived control" and indicate that the personal controllability of decision consequences is one of the most important psychological factors impacting on perceived risk. This perception of control or choice in decision-

making has also been linked to increased self-determination and intrinsic motivation (Deci & Ryan, 1987; Reeve, Nix & Hamm, 2003). If the locus of control is perceived to lie with the decision-maker then there will be a greater conviction that the decision-maker will be able to achieve the desired outcome. In relation to this study the perceptions of principals in relation to control and autonomy in decision-making in their schools and their views of the organisational purpose of the governance mechanism of the regulatory framework could be expected to impact on their propensity to engage in risk-taking in decision-making.

Bandura (1977, p.79, 81,85) refers to this as "personal efficacy" and presents evidence to support that it arises through the acquisition of experience related skills and the ability to be able to use them in difficult or testing conditions. Bandura (1997, pp.450-456) describes the impact of self-efficacy on organisational and managerial decision-making. He emphasises that "it requires a strong sense of efficacy to deploy one's cognitive resources optimally and to remain task-orientated in the face of many organizational complexities" when making organisational decisions in conditions of uncertainty (Bandura, 1997, p.452). He purports that managers with lower perceived efficacy are less willing to take risks in decision-making as they "dwell on risks to be avoided" (Bandura, 1997, p.455). In a more recent paper, Bandura and Locke (2003, p.92) analysed the results of nine meta-analyses of self-efficacy and supports its inclusion in models of decision-making to increase their explanatory and predictive power. Silcox (2003, p.42) cites a range of research in schools that support the premise that principals with high self-efficacy strive harder to achieve organisational and personal goals and this impacts on the choices and decisions they make.

A related body of work that places emphasis on choices made by management independent of organisational preferences, focuses on the concept of managerial discretion. Child's (1972, 1997) seminal work on strategic choice maintains that managers have the discretion to make strategic choices and that firm outcomes are largely dictated by these management choices regardless of external environmental constraints (Child, 1972, pp.10-11; Hoskisson et al., 1999, p.441). Hambrick and Finkelstein (1987, p.379; Child, 1997, p.59) describe the concept of managerial discretion as referring to the "latitude of action of managers" and propose that it is a

function of "(1) the degree to which the environment allows variety and change, (2) the degree to which the organization is amenable to an array of possible actions and empowers the chief executive to formulate and execute those actions, and (3) the degree to which the chief executive personally is able to envision or create multiple courses of action". These factors may be present in organisations, such as education systems and therefore schools, to varying degrees.

Cooke and Slack (1991, p.93) describe a situation where degree of autonomy of the decision-maker and the degree of structure imposed by the organisational environment are both high. This can occur when the organisational hierarchy imposes a framework for decision-making in an organisational environment where there is a high degree of autonomy for managers. Schools would be an example of such a decision-making environment, with autonomous principals making decisions within the bounds of the regulatory framework. Such decision-making frameworks are consistent with agency theory and may be imposed due to concerns about the competence of managers and have the effect of restricting decision-making choices within this structure. Hoy and Miskel (2005, p.117) argue that the need for autonomy and the desire to act independently create a fundamental source of conflict between central bureaucracies and professionals, such as principals, when the control of decision-making is held by the organisational bureaucracy. They suggest that although such authority relationships and control are a common feature of schools, they promote only minimal compliance in professional administrators and may discourage initiative and responsibility in decision-making (Hoy & Miskel, 2005, p.205). The related concept of "power" is also discussed and its use in rationalising decisions based on internal organisational politics as opposed to rational decision-making based on knowledge (Hoy and Miskel, 2005, pp.217-219). Bennett (2001, p.113-118) argues that where there is a disparity in power and knowledge, decision-makers will be more likely to comply with rules and instructions. Evers (1990, p.55) also maintained that hierarchical, centralised decision-making promotes compliance and consistency in decisions. However, he argues that such a structure doesn't promote efficiency and disregards theories of knowledge and its use in decision-making.

Both formal and informal governance structures provide the vehicle through which power is deployed in organisations, including schools. Bennett (2001, p.106) indicates that creating structures that provide discretion for decision-making within schools transfers more power from the education hierarchy to schools. With a more equal distribution of power, principals may be less likely to comply with policies if they do not see them as assisting in achieving desired school outcomes.

However, critics would argue that the power inequality in education is being disguised by the rhetoric of school-based decision-making and management and that the institutionalised power of the central bureaucracy becomes visible when conflict arises (Seddon, Angus & Poole, 1990, pp.29-41). Within such a view principals would not have real and legitimate control within their school. Thorn, Meyer and Gamoran (2007, p.358) report that in the United States, the recommendations for flexible governance in schools, power sharing and use of collective knowledge in decision-making that are arising from research, are not recognisable in the familiar operations of state and district education systems. Mok (2001, p.127) argues that the control of public sector education may be strengthened rather than weakened due to the coexistence of both centralising and decentralising trends in the governance of education. Both of these trends are evident in the Western Australian context with increased accountability and the standards agenda a focus of Commonwealth Government policy (Bauer & Bogotch, 2006, p.449; National Education Agreement, 2008, p.7-9; National Partnership Agreement on Low Socio-economic Status School Communities, 2008, pp.7; National Partnership Agreement on Literacy and Numeracy, 2008, pp.7; COAG Communique, 2008, p.20-21; Federalist Paper 2, 2007, p.23). However, at the same time the Western Australian state government is moving to provide autonomous decision-making to independent public schools (Department of Education and Training, 2009).

The move towards standards and accountability have influenced the governance of schools, but as Bauer and Bogotch (2006, p.449) point out, the necessity for shared decision-making has not been “erased from the responsibilities or expectations of school leadership”. However, it would be expected that principals’ perceptions of propensity for risk would be influenced by the Commonwealth government policy

directions and of State Department of Education and Training's purpose in establishing the governance mechanism of the regulatory framework.

As indicated earlier, the regulatory framework may be interpreted as a compliance mechanism to control decision-making or an educative mechanism to guide decision-making. To comply with perceived leaders' preference, a principal with a compliance view may be more likely to limit reasoned risk-taking and conform to the requirements of the regulatory framework. A principal with an educative view of the framework, however, would be more likely to use the regulatory framework as a guide and make decisions focused on the required outcome for any given situation. Caldwell's (2006, p.188) research supports this hypothesis with the finding that schools that are leading in achieving transformation of the public school system in Australia view agencies of government and their frameworks of policies "as just one of many sources of support". These schools are demonstrating an educative view. Hoy and Miskel (2005, p.103) espouse a similar theory that considers the relationship between the formal system of rules and regulations and the centralisation of authority in schools. They contrast the hindering structure of a compliance system used to gain control and conformity by the centralised hierarchy with an enabling system of rules and regulations that guides problem solving. The coercive hindering approach and the enabling approaches described by Hoy and Miskel align closely to the concepts of compliance and educative governance constructs in this study.

The effect of governance structures on decision-making is further supported by research analysing governance models in higher education institutions (Minor, 2004; Panova, 2008). Panova (2008) discusses the application of four models; collegial, hierarchical, political, and anarchic and the organisational costs in using each model for decision-making. The collegial model, and Minor's collaborative model, align closely with models of democratic and distributed leadership for decision-making in schools (Glickman, 1992; Silcox, 2003; Bauer & Bogotch, 2006). However, the hierarchical model, and Minor's stratified model, are closely aligned to the compliance governance structure discussed in this thesis, where decisions are made by an administrative bureaucracy according to uniform rules, such as the regulatory framework. Elements of the political model are also particularly relevant to this study as this model considers

the effect that demands of stakeholders have on the decision-making process. Panova (2008, p.81) indicates that the organisational costs may be high in situations where powerful stakeholders have conflicting goals.

2.5.2 Public Sector Compliance with Governance Frameworks

The influence of governance as a determinant of risk-taking in decision-making becomes even more significant in the public sector environment where decisions must be politically and legally defensible. Wirtz, Cribb and Barber (2005, p.335) found that public sector policy makers responsible for decisions regarding health policy, "felt accountable to provide decisions which are politically and legally defensible" and "which could be defended in public, including in court". This is particularly relevant for decision-makers in the Western Australian education context given the State Coroner's decision (2002), associated media attention and subsequent policy and procedural developments within the then Education Department of Western Australia. Starr (2008) indicates that the increase in litigation, insurance and compensation claims have resulted in education systems and school principals needing to respond by "identifying, managing and delegating responsibility for risk" in schools. Therefore risk averse principals with a compliance view of the regulatory framework may feel compelled to make decisions where "procedural safeguards are being valued more that the content of the decision" (Wirtz, Cribb & Barber, 2005, p.335). The implications are significant if principals are deterred from pursuing innovative educative strategies due to potential litigation risks.

Peters (1987, p.266) takes a different perspective, arguing that being open to experimentation with new strategies and taking risks is more important in a public sector environment. He maintains that being under continuous public scrutiny allows managers to learn from small scale failures and thus "avoid the embarrassment of big program failures". Peters (1987, p.393) also argues that "tighter control can be achieved through more decentralization" as decentralised management emphasises "market-driven decision-making and fast adaptation". An adaptive view of organisational learning that focuses on correction of errors and use of local knowledge is also favoured by Evers (1990), above hierarchical and centralised decision-making

structures. McMahon (2001, p. 131) and Mok (2001, p.126) extend the adaptive market driven view of organisational learning to decentralisation of decision-making in schools, and suggest that this results in the development of a quasi market that promotes competition between schools and differentiation of services offered. This view of decentralised decision-making requires managers to be empowered to act flexibly, without restriction from an organisational rule book or policy manual such as the regulatory framework.

Peters (1987, pp. 451-457) distinguishes between delegation that is empowering for decision-making and delegation accompanied by constant checking and accountability that does not allow the manager to take "the true burden of responsibility" for decisions. In contrast, Fullan (1993) takes the view that neither centralisation nor decentralisation is the panacea for schools, stating "centralization errs on the side of overcontrol, decentralization errs towards chaos" (Fullan, 1993, p.37). He argues that schools require coordination that has been negotiated, as it assists schools to develop a broader view that connects with the educational environment beyond their local community (Fullan, 1993, pp. 37-39). In his later work, Fullan (2007, p.188) extends this requirement for connection to include "accessibility in a technology-based society". Certainly, making all policy available on the Internet through one site assists in connecting the community with requirements in the governance framework. How principals manage the conflicting demands of centralised governance and marketing of services that requires a decentralised approach may be dependent on the experience of the individual principal. The next section therefore explores the potential for interaction between experience of principals and governance.

2.5.3 Interaction of Experience and Governance

In Section 2.5.1 of the literature review, governance and control mechanisms and the experience of decision-makers were discussed. Models have also been developed that consider the interaction of these concepts. Singh (1986) proposes a complex model that includes control through a factor focused on the level of delegation of authority. This aligns with Sitkin and Pablo (1992) who posit that focus of the organisation's control system, on either process or outcomes, impacts on perceptions of risk and

hence decision-making behaviour. They argue that control systems that focus on the process by which decisions are made lead to perceptions of lower risk, whereas those that focus on outcomes, ignoring how the decision was made, lead to perceptions of higher risk. In the government school context, the compliance view of the regulatory framework focuses on process and should therefore align with perceptions of lower risk according to this theory. An educative view, however, focuses more on assisting a principal to achieve an appropriate outcome and should therefore align with a perception of higher risk. Sitkin and Pablo (1992) proceed to establish an argument for an interaction effect between organisational control systems and individual risk-taking propensity. Thus, for individuals with high risk-taking propensity, a focus on outcomes provides greater opportunity and should encourage their inclination to make reasoned risk decisions whereas a focus on process provides little incentive for taking risks. The high risk-taking individuals may be further encouraged by a belief that "a person gets to the top by taking risks" (MacCrimmon & Wehrung, 1990, p.433). In contrast, for those with risk averse propensity, risk-taking behaviour would be anticipated to be greatest when there is a focus on process such that responsibility for negative outcomes is minimised.

In the context of this research, this can be envisaged as an interaction between experience and an individual's view of the purpose of the governance framework. Experienced principals with an educative view would therefore be expected to engage in increased risk-taking behaviour and may do so as a deliberate strategy to get ahead and gain promotion. Caldwell (2006, p.193) concludes that "creative entrepreneurial risk-taking needs to be nurtured" and "will be a normal expectation for those appointed to principalship". More recently, Starr (2008, p.7) found that principals perceive that compliant and cooperative adherence to policy and procedures mediates their exposure to risk. This study predicts that new and acting principals with a compliance view should be the most unlikely to display behaviours involving risk and should rather make decisions that conform to requirements within the regulatory framework. This is also consistent with the view of Sullivan (1997) who found that principals with a low sense of self-efficacy are more likely to conform as they are more dependent on line management and governance structures.

2.6 STAKEHOLDER IMPACTS ON DECISION-MAKING BEHAVIOUR

In Chapter 1 the move to decentralisation of governance in the public sector, and in particular in schools, was introduced. This move to decentralised governance has been noted in many countries as part of programs of economic reform and globalisation. Although the rationale for such governance changes may be initially driven largely by an economic business case, a subsidiary outcome of shifting control from central hierarchies to local authorities or communities can be to make service delivery more responsive to local user needs. Bardhan (2002, p.193-202) goes further to suggest it provides an opportunity for increased participation in governance and decision-making for otherwise disenfranchised communities.

In the business context, the study by Carpenter, Pollock, and Leary (2003) provided evidence of the critical role of stakeholders on strategies involving reasoned risk-taking. They found that the risk attitudes and experience of individual stakeholders influenced reasoned risk-taking strategies. A further study by Carpenter and Westphal (2001) examined how the network ties of board members contribute to strategic decision-making. A sociocognitive perspective of board involvement, including social structure context and level of social contact with other directors, was used to assess the contribution of these relationships to strategic decision-making. In the view of agency theory espoused by Beatty and Zajac (1994) it is the role of corporate governance mechanisms like the nature of influential stakeholders to encourage risk-taking by managers. Conversely, Gilley, Walters, and Olson (2002) found that risk taking by management had a positive effect on stakeholder satisfaction.

In the context of decision-making by school principals, these stakeholders include parents and community members in the school locality. The influence of corporate governance mechanisms on parents and community members and their involvement in decision-making is reflected in the educational literature. It is long established in the literature that having a shared vision and goals for a school has the potential to unite a school and its community (Bennis & Nanus, 1985) and studies in several national contexts have shown that involvement of stakeholders, such as community members, is associated with higher achieving schools (Hallinger & Heck, 1999, pp.180-183; Anderson & Minke, 2007, p.311). Fullan (2007, p.189) goes further to claim that the

research shows that “the closer the parent is to the education of the child, the greater the impact on child development and educational achievement” and cites a range of educational research studies that support this conclusion. The model of parental involvement developed by Hoover-Dempsey and Sandler (in Anderson & Minke, 2007, p.313) delineated five levels of process variables that link involvement in their children’s education with student outcomes. Parents, as their child’s first educator, have knowledge about their children’s skills and learning needs and a vested interest in their educational achievement, so such research findings are intuitively reasonable. Laycock (2001, p.136) reports some success in a community education program in an area of second and third generation unemployment that was well supported by the local community. Glickman (1992, p.25) argues that a shared vision of the goals of education should be based on commitment between school and community rather than compliance. He advocates democracy and shared governance with stakeholders and democratic practices in school renewal processes. Laycock (2001, p.137) has a similar view and emphasises the importance of acknowledging the community contribution as an integral component of planning and provision of education. Thus there is consensus across the literature on the importance of the role of parents and community in contributing to the educational outcomes of schools. It is less clear to what extent and how this occurs in different communities.

The relationship between the organisational structure and administration of a school and its broader environment and community is significant in the decision-making process. Hallinger and Heck (1999, p.183) indicate that the extent of collaboration and engagement with the community are important because community expectations and beliefs influence the attitudes of principals. The information perspective described by Hoy and Miskel (2005, pp. 238-242) treats the external environment as a critical source of information for decision-makers in schools. They argue that problems for principals can arise due to uncertainty about factors in the external environment, specifically:

- *Lack of knowledge and skills make it difficult to understand the information from the environment.*
- *Preferences regarding possible outcomes become less clear.*
- *Alternative courses of action and their outcomes become increasingly unpredictable and risky.*

- *Strategies and tactics become relatively difficult to communicate and implement.*
- *Potential outcomes from a decision are not known.* (Hoy & Miskel, 2005, p.242).

An important factor in the external environment that impacts on principal collaboration and engagement with the community is the location of the school and characteristics of the community it serves. Contingency theory (Fidler, 2001, p.52) suggests that school leadership needs to be tailored to the circumstances and the external context including where the school is located. Minor (2004, p.42) argues that in higher education institutions that historically cater to a black student population, contextual understanding is essential in determining the appropriateness of governance structures and decision-making practices. Dalton, Fawcett and West-Burnham (2001) claim that the reconceptualisation of the relationship between schools and their external environment is one of the most significant changes in education this century. They express this as "many schools have been in their communities but not of their communities" (Dalton, Fawcett & West-Burnham, 2001, p.145). These studies reflect a common view of the importance of involving community stakeholders in school governance processes. Decision-making processes that are based on local school sites can enhance the influence and contribution of stakeholders and community (Bauer & Bogotch, 2006, p.447).

Where a school is located in a community that differs from the norm, the expectations and needs of the community are more likely to be unique to that particular community. Fullan (2007, p.202) cites ethnicity and poverty/affluence as two examples of critical characteristics of educational communities that need to be considered in making policy decisions. Silcox (2003) considered whether principals' leadership approaches to school renewal were influenced by the characteristics of individual schools and their local communities. Differences could be due to factors including geographical location or cultural influence such as would occur in remotely located communities. A study by Petrakis (2005) considered cultural values and idiosyncrasies as one of the factors impacting on individual risk propensity and perception. He argues that entrepreneurship is facilitated by cultures that are "high in individualism vs collectivism,

low in uncertainty avoidance, low in power – distance, and in masculinity" (Petrakis, 2005, p.236). This view is supported by research in the United Kingdom that traced the development of a centrally advocated approach to school management and compared it to the reality of practice in schools. Levacic, Glover, Bennett and Crawford (1999, p.26) found that in schools with unique circumstances, such as in socially deprived communities, there were limitations in the use of the centralised management approach. Similarly, Karstanje (1999, p.34) indicates that in Western, Central and Eastern European countries there is a recognition that local needs and circumstances do not allow educational problems to be solved by central governance at a distance. These findings imply that the need for decentralised decision-making may differ dependent on the characteristics of the local community and school.

In communities where the cultural background differs from that of the principal, the risk propensity and perception of stakeholders may differ from that of principals such that greater input from the community is required to reach agreement on decisions. Studies in rural decision-making have considered the impact of risk and uncertainty (Bacic, Bregt & Rossiter, 2006). Bacic, Bregt, and Rossiter (2006) posit that in these circumstances incomplete information is one of the main constraints in decision-making. A principal in a rural or remote school, with a large proportion of Indigenous students, may face greater constraints in their decision-making due to lack of information about the expectations and needs of the community of the school. In addition, the expectations and needs of such a community are less likely to align well to policies that have been developed centrally to apply to generally applicable circumstances. It is therefore posited that there will be greater influence on principals from the parent and community stakeholders in these communities to take risky decisions in order to meet their differing needs and expectations. Such involvement is also required to attain lasting change.

Mok (2001, p.125) suggests that the process of globalisation has resulted in fundamental change in the philosophy of governance and the way the public sector is managed. Bardhan (2002, p. 202) goes further to argue the case for devolution of power and delivery of government services to local communities, in order to make governance of public services responsive to the needs of the majority of the population.

These global changes in governance are also evident in Western Australian public schools. The move from economic justifications for delivery of public sector services to one that is responsive of community needs reflects different philosophical positions of modernism and postmodernism. The literature review may have been more parsimonious with only a brief discussion of philosophical perspectives. However, it is relevant to consider these philosophical positions given that this study draws on postmodern thinking, in particular complexity theory to understand the nature of public sector organisations and decision-making in schools. The approach of combining the insights of complexity theory with a quantitative methodology is not incompatible as complexity theory is based within a mathematical paradigm. Complexity and chaos theories are being used to provide valuable insight into traditionally positivist arenas of thought, including economics and organisational theory (Waldrop, 1993; Gell-Mann, 1994; Holland, 1995 & 2000; Nagashima, 1999; Taleb, 2007). Therefore, the philosophical viewpoints of modernism, postmodernism and complexity theory are described and their relevance to thinking about the constructs in the research questions presented in Chapter 1 are explored through reference to the literature.

2.7 THE PHILOSOPHICAL POSITIONS OF MODERNISM AND POSTMODERNISM

There have been many views and writers on the perspectives of modernism and postmodernism. Increasingly, postmodern and complexity approaches are being used in educational leadership research to gain insight into dynamic educational environments (Silcox, 2003; Gilstrap, 2005; Eacott, 2009; Daniello, 2010). The historical background and key issues related to each of these philosophical positions will be outlined in this section as a prelude to considering how each perspective assists in understanding public sector organisations, leadership and specifically decision-making by school principals. The philosophical position of postmodernism and in particular complexity theory provides a different lens to understand and model decision-making by principals in a complex school environment.

Modernism has evolved as a philosophical position through a change in the thinking of philosophers, scholars and mathematicians since the 17th Century. Prior to this time thinking was significantly influenced by organised religion, in particular in Western

society, the Roman Catholic Church. Following an epoch named the "Enlightenment" in the 18th Century, positivist philosophy became dominant in the Western World. Scruton (1995, p.1) defines the Enlightenment as the "irresistible current of secularisation, scepticism and political aspiration which culminated in the French revolution". He makes the connection between modernism and "enlightenment, with individualism, and with the emancipation of thought from religious and theological dogma" (Scruton, 1995, p.501). Scruton (1995, p.1) also points out that this decline in the central position of Christendom coincided with the rise of natural science. The shift to modernism rationalised philosophy, placing the focus of philosophy in the present tense and on the mind and body away from the soul and the hereafter. From the perspective of logical positivism, all metaphysical, ethical and theological doctrines are meaningless, because they are unverifiable. In addition, by the second half of the 20th Century modernism had succeeded in establishing global uniformity in the measurement of time and space and in developing socially disembedded mechanisms for exchange that crossed local social contexts (Whiteley J, 2004, p.2). Money as a symbolic token of exchange is an example of such a mechanism. For this thesis, modernism is construed as a philosophical paradigm that is positivist and based on the assumption that a single reality exists, can be identified and empirically measured using objective scientific methods.

Scruton (1995, p.503) indicates that postmodernism arose from "a widespread pessimism about the modern world". This approach has taken several forms; from the documentation of postmodern society conducted by philosophers such as Jean Baudrillard (1976 translated by Grant,1993) through to discussion of the collapse of the "narratives of legitimation" that have been used by modernists to justify Western society and philosophy since the Enlightenment, by philosophers such as Jean-Francios Lyotard (Scruton, 1995, p.504). Lyotard's interpretation of postmodernism related to the context of narrative and involved a transformation based on questioning such narratives and "an incredulity towards grand narrative" (Calas & Smircich, 1999). These discussions were not necessarily aimed at suggesting that the postmodern paradigm was more legitimate or truthful but promoted reflection and self-awareness of the researcher's complicity in their study and writing.

Within the modern philosophical position, empiricism has been a dominant epistemology and theory of science for most of this century. Within this view, knowledge is established by induction from incorrigible statements, or observations (Outhwaite, 2003, p.197). From the empiricist perspective, knowledge is ultimately derived from sensory experience (Titus, Smith & Nolan, 1994, p.8). In contrast, rationalism, which was first proposed by Kant (Scruton, 1995, p.30) purports that reason is the source of knowledge. "It denies the acceptability of beliefs founded on anything but deductive or inductive reasoning" (Bullock, Stallybrass & Trombley, 1988, p.721). For the rationalist, knowledge can be developed through thought alone and comparison of ideas (Titus, Smith & Nolan, 1994, p.179).

Despite these differences, both of these modern philosophies are positivist in that they are based on an assumption that a single external world order exists and can be empirically measured by independent observers using objective methods. These methods may include observation and prediction, as in empiricism, they may use investigation and induction as in Scientism (Bullock, Stallybrass & Trombley, 1988, p.760) or they may be based on deductive reasoning, as in rationalism. But in each approach a positivist methodology is used to determine universal laws which can be generalised to apply to and explain a range of contexts.

In contrast, the postmodern approach, rather than using rigorous measurement and quantitative techniques, aims to produce "pictures of reality" (Whiteley J, 2004, p.7) and recognises that there is pluralism of understanding and meaning within language and organisations. The ontology of postmodern research, rather than trying to establish the facts or truth as occurs in modern research, tries to take account of socio-cultural processes operating and how participants in the research or the organisation impact on management and change within the organisation. The role of participants in the construction of meaning and consideration of their voice in writing text is a significant consideration in the conduct of the research, even where these are alternative or contradictory views.

Structuralism and structural linguistics, within modernism, were founded on a scientific model of language "that was a closed system of elements and rules for the production of social communication of meaning" (Whiteley J, 2004, p.3). In contrast, Saussure's (1959, translation 1974) postmodern approach of "semiology" is described by Calas and Smircich (1999) as moving from linguistics with a focus on substance or meaning to a focus on language as a structural system of relations and differences. Calas and Smircich go on to point out that within post structuralism it is argued that there are no stable phenomena or meanings that exist beyond their representations. Whiteley (J, 2004, p.3) interprets this as: "All we have as knowledge is the representation itself".

The study of discourse in postmodernism has included concepts named: "hyperreality" by Baudrillard in 1976 (Grant, 1993 English translation, pp.70-75) in which the culture of electronic media has replaced earlier interpretations of reality with a new hyperreality; "difference" by Derrida in 1967 (1978 translation, pp.79-153, pp.193-194, pp.200-205) in which each term is analysed, compared to and reinterpreted by contrasting with its unstated antonym; "deconstruction" by Derrida (1978 translation p.198) in which text is broken down to reveal its underlying assumptions and contradictions; and "mundane reasoning" and "power" by Foucault (1994, pp.447-452) which rejects the modern totalising view of history and questions the idea of human progress, which has been fundamental to the modern approach (Tarnas, 1991). Calas and Smircich (1999) argue that this entails authors specifying their intent and being accountable for choices they make and arguments they put forward in their writing. Thus postmodernism may be summarised not so much as a position or philosophical viewpoint in itself but rather as a critique and rejection of philosophical positions taken in modern thought. In that respect, this section of the literature review is included to clarify assumptions and positions taken in developing a model to investigate the research questions, in the choice of methods to collect and analyse data and in focusing on perspectives in the discussion that may have been approached differently by another researcher.

An example of this postmodern critique that relates specifically to decision-making, is the philosophical discourse between Foucault and Habermas on the concept of "power" (Kelly (ed.), 1994). Nietzsche (1968) also considered the relationships of power and

reality, and power and knowledge. In the postmodern perspective, power defines reality and carries more weight in decision-making than rationality or knowledge. Hoy and Miskel's (2005, p.217) explanation is that "power often blurs the difference between rationality and rationalization". They make the distinction between these terms that: "rationality is the application of evidence and reason to make decisions"; whereas "rationalization is an attempt to make a decision seem rational after it has already been made" (Hoy & Miskel, 2005, p.217). Within public sector organisations the influence of politics and power are significant in decision-making and the hierarchical structure of these organisations legitimates the use of power in rationalisation of political decisions.

Even though the postmodern view has become well accepted by the research community, the legacy of the modernist philosophers is strongly evident is the structures and thinking of businesses in Western society, including public sector organisations. A key aspect has been the positivist epistemology which has dominated Western philosophy and research in the modern era (Scruton, 1995, p.274). Chapman (1997, p.9) observes that "the positivist research program, with its theory, hypotheses, data collection (questionnaires), multiple regressions, and tests of validity, remains the standard fare". The evaluation and research units in many businesses, including public service organisations, reflect this modern approach as the dominant paradigm in the conduct of research. In this respect the methods of data collection analysis used in this study fit within a quantitative positivist paradigm. However, the preliminary qualitative data collection and development of the model have utilised postmodern thinking and in particular complexity theory in developing and understanding the constructs that underpin risk-taking in decision-making. The frame of complexity theory will also be used in the final discussion chapter as a lens to interpret the results. Such an approach in using quantitative methods within the frame of complexity theory is well established as described in the following section.

2.8 COMPLEXITY THEORY

Complexity theory, which studies the fundamental properties and dynamics of non-linear feedback networks, is often used in a metaphorical sense within the management discipline. Originating from the natural sciences such as physics and biology (Waldrop, 1993, p.30, 67; Gell-Mann, 1994, p.16-17; Holland, 1993 and 2000; Wheatley, 1994, pp.6-11; and 2006, p.7-13), properties such as non-linearity, unpredictability, adaptability, and spontaneous order are transported to the design and development of organisations. Holland (1993, 1995, 2000; Waldrop, 1993, pp.160-174) develops theory related to complex adaptive systems and sets up mathematical frameworks and computer simulations to explore such processes as they occur in natural systems. Stacey (1996) uses complexity theory to talk about organisational life. There have been many writers in this field, but in the interest of a parsimonious discussion this section draws largely on the work of Holland and Stacey in a demonstrative way as they are prominent in the field.

Stacey (1996, p.310) divides complexity theory into two types: the theory of chaos which is concerned with deterministic feedback systems and theories of complexity which are concerned with adaptive systems. Stacey (1996, p.309) indicates that these theories have emerged from "natural scientists who have been constructing a coherent framework for understanding the emergent behaviour of complex systems". Deterministic non-linear feedback systems are described by Holland (1995) and Stacey (1996) as networks consisting of large numbers of components interacting with each other according to certain rules or laws, for example, the solar system or a chemical system. These are deterministic in that the rules which the components follow are precisely defined and fixed over time with no random elements in their formulation.

In contrast, Stacey (1996) indicates that a probabilistic system has random terms in the laws to represent changes impacting on the system from outside that are not driven by the laws, errors in the formulation of the laws or errors in the data being fed into the laws. Human systems, including organisations, normally use probabilistic rather than deterministic formulations. Both differ from adaptive systems which consist of agents that change their rules of conduct as the system evolves. Stacey (1996, p.334) argues

that human systems are of the adaptive kind. Decision-making processes in public sector organisations would fit this category.

A significant amount of positivist thought and empirical scientific method is based on the dynamics of deterministic systems theory. Newtonian physics and also thinking in the social sciences and psychology have been heavily influenced by these models. Mathematical theories of chaos and computer models have been developed to describe chaotic systems and predict their behaviour (Nagashima & Baba, 1999; Holland, 2000). Such models are modern in that the future of any system can be predicted and consequently controlled. The model that is developed in this study can assist in understanding factors that impact on risk-taking in decision-making by school principals. However, in contrast to a mathematical model, development of a model in this case does not imply that principals' decisions are predictable if attributes of an individual principal are known. Complexity theory is not so precise, but indicates patterns established through previous behaviour. The patterns in complexity theory are able to be used in prediction, though they do not determine future patterns (Daniello, 2010, p.5). In this study, a model is developed to identify where decisions of principals may follow a pattern established by other principals with similar attributes in similar environments.

In a complex adaptive system the models are formulated in agent-based terms (Stacey, 1999, p.275). Rather than have a series of rules operating at the macro level, "the system is modeled as a population of agents interacting with each other according to their own if-then rules". As these models rely on local interactions of agents as opposed to collective responses by the whole system they provide a more appropriate analogy to individual human beings making decisions within an organisation than other complexity models. Stacey (1999, p.334) argues that human systems are adaptive in that agents do not just blindly follow the same set of rules, but change their rules as they go along. In other words, they engage in double loop rather than single loop learning.

These models represent a postmodern view in that they are evolving systems that are unpredictable and uncontrollable. Cilliers (2000, p.112) indicates modern concepts including "a transcendental world of perfect ideas … constitute an avoidance of complexity". He suggests (2000, p.113) that the "postmodern approach is inherently sensitive to complexity". He goes on to argue (2000, p.116) that the multiplicity of discourses within the postmodern view provide an acknowledgement of complexity and conversely that postmodern society, as a system, can be described in terms of the characteristics of complex systems (Cilliers, 2000, p.119).

Holland (1995, p.4) and scholars at the Santa Fe Institute coined the term "complex adaptive systems". A complex adaptive system consists of large numbers of agents interrelated in a nonlinear way, that is, a way in which the action of one agent can provoke more than one response from other agents (Holland, 1995; Stacey, 1999, p.335). The system can also interact with other complex adaptive systems and together they constitute the environment to which each must respond. Each agent can acquire information about the systems in its environment and its interaction with those systems and employ this feedback or learn to adapt as a consequence of the acquired information.

Computer based models have been developed to make predictions on the basis of past observations and prepare strategies to mimic complex phenomena (Gell-Mann, 1994, pp.305, 312-313, 320-321; Holland, 1995, p.95; 2000, pp.118-121; Stacey, 1999, p.284). The co-adaptive agents within the models construct schemata, which are patterns for rules, to describe and predict one another's behaviour (Holland, 1995, pp.60-65). These systems provide an analogy that closely describes how humans operate in decision-making, making use of their previous experience or their knowledge of others' experience to decide on a strategy for their current circumstance (Gell-Mann, 1994, pp.17-19, 323; Holland, 1995, p.68).

The use of mathematical modeling and the postmodern approach of complexity are not mutually exclusive, dependent on how the models are used. Taleb (2007, p.284) describes two epistemological approaches, the traditional Platonic approach and a

skeptical empiricism approach. Both allow for use of scientific method and mathematical models. The distinction is in how the models are created and used. Taleb (2007, pp.229-252) is highly critical of Gaussian models, particularly their use in economic and social science modeling. This is because Gaussian models do not allow for the occurrence of "black swans" which he describes as random highly unlikely events. However, his criticism is not of mathematical modeling or even Gaussian theory per se. Rather his very strong criticism is of how such models are applied from within a philosophical position that assumes that these models mirror reality and can be used to reliably predict future events. The traditional Platonic approach seeks certainty, whereas the skeptical empiricism approach works experimentally from data to develop a model that "seeks to be approximately right across a broad set of eventualities" (Taleb, 2007, p.284). This skeptical empiricism approach is taken in this study with the model developed through qualitative data in addition to the literature. Hypotheses are then tested quantitatively to establish patterns, but it is not assumed that the model will allow accurate prediction of principals' future behaviour.

The establishment of these patterns is based on fractal geometry. Fractal geometry (Mandelbrot, 1982) is the mathematical system underlying the theory of complexity. Fractal shapes are self similar in that they all obey the same initial conditions and as they are magnified the same processes, rules and shapes continue to be present (Gleick, 1988, p.103). Gleick describes this as "recursion, pattern inside of pattern". Gleick (1988, p.96) and Wheatley (1994, p.128 and 2006, p.123-124) describe Mandelbrot's analysis of the coastline as an example of this concept, with the geometric shapes and irregularities of peninsulas and bays remaining constant, as the scale of measurement is reduced. Referring to the idea of a basic underlying pattern or shape as represented by "initial conditions", the properties of fractals suggest that the same basic pattern when used in self-similar, but not conformist, ways can result in irregularity and complexity such that each part, representing initial conditions is the whole and whole is correspondingly the part. In other words, at whichever magnification from the smallest part to the complex whole, the same set of initial conditions can be detected. Taleb (2007, pp.253-273) recommends the use of Mandelbrotian fractal models in modeling economic and social systems as such power models allow for the possibility of highly unlikely events that cannot be accounted for

with Gaussian models or traditional probability theory. Wheatley (1994, p.132 and 2006, pp.106-107, 128-129) applies the concept of fractals to organisations and discusses the implications for leadership. She argues that there is a consistency and predictability to an organisation's values and ways of doing business that are reflected in the behaviour of all employees including senior management. This view has implications for effective leadership and the importance of providing and communicating strong and sound organisational vision and values (Wheatley, 2006, p.133). It aligns with the views discussed in section 2.5.1 regarding how common perceptions of compliance requirements can be reflected in decision-making practices.

Education leaders in schools may even act as attractors. Attractors are attributes of the system that result in a regular pattern emerging. Lewin (1999, p.20) describes them as states to which the system settles. A strange attractor within a system allows unique and hidden patterns and behaviours to emerge. ABC video (Chaos, 1988) describes this as "order within disorder". Wheatley (1994, pp.134-135 and 2006, pp.132-134) suggests that within organisations the capacity to make meaning of their own role and the purpose of the organisation acts as a "strange attractor" for individual employees that results in their responding with allegiance and effort to the organisation and their role within it. Guastello (2007) goes further and uses a non-linear model that incorporates attractors to investigate the emergence of leaders. This approach has similarities to agency and in particular, stewardship theory, in regard to the role of principals in the governance of schools. Plowman et al. (2007, pp.345-346) utilises a complexity perspective that supports a view of leadership where transformational leaders enable sensemaking for others within the organisation.

One further aspect of complex systems that impacts on the modeling of such systems relates to the initial conditions which are the original conditions that underlie the design of something. To accurately predict how a dynamic system will progress it is necessary to be able to accurately and precisely measure and describe these conditions. Gleick (1988, p.60; Chaos, 1988; Holland, 2000, pp.43-45) indicate that the "butterfly effect" is encountered when small errors compound to produce a chaotic and unpredictable outcome that is impossible to forecast. In addition, in attempting to analyse what is occurring in any organisation it becomes difficult to identify causal connections as there

are many variables in any organisational system that interact and these may also be sensitive to the initial conditions (Waldrop, 1993; Fidler, 2001, p.53). As a consequence, problems and situations that occur in organisations that may appear identical, can yield very different outcomes. This occurs in the theory of chaos, as when a deterministic nonlinear feedback system is driven away from a state of stable equilibrium towards instability, it passes through a stage of bounded instability in which it displays highly complex behaviour moving randomly between positive and negative feedback (Stacey, 1999, p.312). These contradictory forces act in unpredictable ways to produce disorder or chaos. In a state of deterministic chaos a system operates to amplify tiny changes in starting conditions into major alterations of consequent behaviour. Stacey (1999, p.324) calls this "sensitive dependence" on initial conditions. Waldrop (1993) and Wheatley (2006, pp.78-79) argue that positive amplifying feedback can promote growth and change in systems and organisations over time. Systems that adapt and reorganise themselves in such ways become "self-organising systems" that continually reorganise to incorporate new information when faced with disequilibrium (Waldrop, 1993; Wheatley, 2006, p.80-83). In contrast, organisations that proliferate and require compliance with many rules and regulations may move away from their essential initial conditions and become unable to adapt to new or changed circumstances. These aspects of complexity theory may be very useful when used to analyse the workings of both the centralised hierarchy of the Department of Education and Training and also the system of schools. The impact and relevance of complexity theory on public sector organisations and subsequently on decision-making in schools is explored in the following section.

2.9 THE IMPACT OF MODERNISM, POSTMODERNISM AND COMPLEXITY THEORY WITHIN A PUBLIC SECTOR ORGANISATION

In this section the view of decision-making in the context of a public sector organisation with a positivist lens will be contrasted with that of a postmodern lens. This will be followed by a consideration of the consequences of incorporation of chaos and complexity theory and related philosophical ideas in relation to decision-making by school principals, based on the governance mechanism of the regulatory framework.

Weber (1947) has been influential in shaping modern views and analysis of social systems, including organisations. Opposed to the functional approach to analysis of social systems, he developed bureaucratic principles to consider organisations in a scientific manner and focused on analysis at the level of individuals to understand organisational change. Weber (1947, p.337) considers "the development of the modern form of the organisation as nothing less than identical with the development and spread of bureaucratic administration". In this view bureaucratic administration is a rational process that takes the form of control through formal hierarchies and the enactment of regulatory measures (Weber, 1947, p. 340). Habermas (2006, p.44) acknowledges and builds upon Weber's work in discussing the tendency of government to develop bureaucratic administrations that are similar to military structures for the provision of public services.

Gharajedaghi (1999, p10) indicates that the modern mechanistic view of organisations is as a predictable, controllable mechanical system. The modernist lens assumes that ultimate truths exist in relation to policy positions and their impact will be consistent across a range of contexts. A consequence of such assumptions in development of policies and procedures is an expectation that they will be followed and complied with by all managers and staff in each school type, in each geographical location, without regard to contextual issues such as students' needs or community expectations. The policy and procedures documents are deemed to provide an efficient framework for decision-making, regardless of the contextual circumstances that apply locally.

The existence of governance mechanisms such as the regulatory framework described is based on assumptions that are rational and empiricist. Policy writers within the central office of the Department of Education and Training work under the assumption that policies and procedures can be developed that will apply universally to all schools and circumstances. Such a view aligns with the position of Compte (in Whiteley A, 2004; Bullock, Stallybrass & Trombley, 1988, p.789) and Durkheim (in Whiteley A, 2004; Bullock, Stallybrass & Trombley, 1988, p.337, 821) where universal laws are invariant across societal contexts.

Hoy and Miskel (2005, p.8) report that early systems analysis of schools viewed them as closed systems with little or no consideration given to influences or constraints from the external environment. They describe three systems perspectives that provide a view of schools as organisational systems. The first, the rational system, is the same as the mechanistic model described by Gharajedaghi, and had roots in the work of Taylor (1947). Under this model, a hierarchical authority controls the decision-making of individual principals through a requirement for compliance with established rules and regulations (Hoy & Miskel, 2005, pp.11-12). This model reflects the compliance view of the governance mechanism of the regulatory framework consistent with the rational empiricist view.

Biological systems have also been used to model the working of organisations. Gharajedaghi (1999, p.11) indicates that these models conceive of the organisation as an "unminded living system" with each part reacting in a predefined way to information it receives and events that occur in its environment. Two examples of this type of system, are deterministic and probabilistic feedback systems, which are based on precisely defined rules that are fixed over time. These systems, which are based on scientific models, also reflect a modern philosophical view, as there are no random elements in their formulation.

The assumption that social structures and organisations can be classified in a modernist, rational way has been challenged. Chapman (1997, p.18) indicated that these debates have progressed to include the field of business studies. Gharajedaghi (1999, p.12) describes organisations as "multi-minded sociocultural systems". In these systems each part can exercise choice and each member of the system "share values that are embedded in their culture" (Gharajedaghi, 1999, p.13). The second view described by Hoy and Miskel (2005, p.13-16) is a "natural" model that arises from a human relations approach to organisational systems. Within this perspective the organisation consists of social groups of individuals, with their own unique beliefs, values and motivations. A perspective of schools that integrates these approaches is the "open" system described by Hoy and Miskel (2005, pp.18-19). This perspective acknowledges that formal structures exist to provide direction to achieve specified goals, but recognises the influence of both the external environment and also the

idiosyncratic interests and beliefs of principals that may conflict with organisational directions.

Postmodern thinkers have reacted against the modernist view to provide an alternative perspective of society and organisations that rejects the modernist meta-narrative and associated unitary vision of science and society (Calas & Smircich, 1999; Eacott, 2009). The philosophical position of postmodernism and in particular complexity theory provides a different lens that could be of greater value to principals attempting to make decisions in a complex school environment. Whiteley, A (2003, p.6-7) points out that chaos theory "belongs to the natural sciences domain", but goes on to suggest that it can provide a helpful metaphor for the study of human relations in the workplace. Bardhan (2002, p.186) indicates that postmodern thinkers and multicultural advocates support moves to localised governance of public services. Complexity perspectives are being increasingly used to provide empirical support for a different view of organisational leadership that is adaptive and enabling (Uhl-Bien, Marion & McKelvey, 2007; Boal & Schultz, 2007; Plowman et al., 2007; Osborn & Hunt, 2007). Specific to education, Seddon, Angus and Poole (1990) adopt a theoretical perspective informed by conflict theory in their examination of the economic, political, social and cultural pressures that have contributed to the rise of school-based decision-making and management in Australia. They point to the demands for equitable participation and outcomes of schooling and a democratic sharing of the institutionalised power in the governance of education as a key impetus for increased community involvement in schooling.

The call for equity is complex in itself and raises the question of what is meant by equity. Does it refer to equity in participation, achievement of outcomes or both and does it include the notion of equality and the ethic of justice? The ethic of justice, as described by Shapiro and Stefkovich (2001, p.13) considers equity and equality in relation to the fairness of rules, laws and policies, whether exceptions to them will be considered and under what circumstances. This is a question that considers the rights of individual students and their specific educational needs to achieve equity, versus the consistent application of rules and policies equally for all students. Shapiro and Stefkovich (2001, p.15) indicate that critical theory, as in the postmodern approach,

requires educators to consider inequities in society such as social class, race and gender in determining who benefits from governance structures and which voices are silenced. Consequently, educators may need to make moral decisions based on an ethic of care (Shapiro & Stefkovich, 2001, p.17). Within this ethical paradigm, rather than following a positivist approach with standard rules and policies applicable to all, the principals of schools would need to consider the silenced voices, and what the long term effects of a decision may be on individuals, the community and society in general. This approach employs a decision-making and leadership style that emphasises relationships and connections with key stakeholders in the community, which aligns with the complexity model in understanding decision-making by school principals. It promotes equity in outcomes of schooling, as opposed to equality of opportunity to participate in schooling which follows from consistent governance strategies applicable to all students in all circumstances. The concept of stakeholder characteristics included in the model developed for this study incorporates this view.

Complexity theory was used in this study to assist in understanding decision-making by school principals. The dynamic nature of schools requires principals to cope with complex dilemmas in their daily decision-making. Klein and Weiss (2007) examine the integration of two diverse forms of decision-making in schools, intuitive and systematic, and conclude that the two seemingly incompatible approaches are not mutually exclusive. Complexity theory assists in making sense of how decisions can be made in a complex environment within an organisational hierarchy with regimented control systems (Uhl-Bien, Marion & McKelvey, 2007, p.300; Plowman et al., 2007).

Napoli (2003, p.3) makes the point that within organisations, management is expected to make the organisation predictable and stable by putting systems in place. This is what the management of the Department of Education and Training is doing via the regulatory framework. Legislation and regulations are necessary to allow organisations to have “a licence to operate” (Napoli, 2003, p.14). In the case of schools these laws are provided in the *School Education Act 2000* and *Regulations 2001*. However, in addition to these, over 140 departmental policies have been developed to further guide the decision-making and action of principals in government schools. Whiteley, A (2003, p.3) indicates that the language of rules, standards and procedures was introduced and

institutionalised in industrial and later in service industries with the assumption that they would be interpreted similarly by employees as by the employers who wrote them. However, lack of consistency in interpretation of policy on the regulatory framework was found to be an issue impacting local school decision-making in Western Australian schools (Trimmer, 2003a, p.30).

Lack of consistency in interpretation was compounded by lack of flexibility in implementation across Western Australian school districts (Trimmer, 2003a, p.30). Napoli (2003, p.3) argues that if the aim of achieving a predictable and stable organisation were possible "we would have no need for managers". Managers are needed to change or even bend the rules to ensure that decisions are made and strategies put in place to meet unforeseen and different situations that are encountered (Napoli, 2003, p.4). Within complexity theory, leadership needs to be adaptive and enabling to reflect the dynamic and complex relationships of organisations operating in the current "knowledge era" (Uhl-Bien, Marion & McKelvey, 2007, p.301). Principals are managers and leaders of schools and this point clearly applies. To successfully manage the school, principals will need to adapt the rules to ensure the needs of individual students and the objectives of the organisation are met. Stacey (1996, p.22) also supports this view indicating that "managers are needed because organisations do not run according to a given set of rules: organisations keep producing surprises because their members and the members of the organisations they interact with keep changing the rules."

The type of decision-making and rules that are required are dependent on the circumstances of the situation. Stacey (1996, p.27) and Napoli (2003, p.6) refer to situations that are close to certainty. In these situations the principal or manager can predict the consequences of a decision based on past experience and rules or procedures that have been formulated to deal with such circumstances can be applied with reasonable confidence of the outcome. This is because the past experience that has guided the development of the rules has enabled clear links between cause and effect to be identified (Stacey, 1996, p.33; Napoli, 2003, p.9). However, in situations far from agreement and certainty (Stacey, 1996, p.27; Napoli, 2003, p.7) it is not possible for managers or principals to know with any clarity what has caused the change or what

the consequences may be. Stacey (1996, p.27) indicates that when managers confront open-ended change far from certainty they are faced with actions and events that have unknown long-term consequences. Inevitably conflict occurs regarding how to interpret what is going on and how to design actions to deal with it. Predetermined rules and authority structures become useless as effective means of settling the conflicts because they presuppose that someone had made a decision and knows what to do. In contrast, complexity leadership theory suggests that destabilising the organisation by creating and highlighting conflict and embracing uncertainty enables innovative outcomes and solutions to emerge (Plowman et al., 2007, pp.348, 354).

In these circumstances the outcomes of any decision cannot be predicted with any certainty and it becomes important for principals or managers to identify the opportunities that may be available in solving the problem. In some circumstances, decision-makers will operate within a "bounded rationality" by limiting the scope of their decisions (Simon, 1957, p.198; Williamson, 1975, pp.22-23; Child, 1997, p.52). This may involve ignoring complexities within the environment that may impact on the problem or considering only a limited number of alternatives for solution (Hoy & Miskel, 2005, pp. 300-302). Napoli (2003, p.11) indicates that in these situations "people rely more and more on the relationships that they have with each other and the dynamics of those interactions adds to the complexity". This view is supported by current thinking in the field of educational leadership (Eacott, 2009) and fits well with the ideas about complex adaptive systems and the reference to schematic analyses.

Principals use a range of relationships both within and external to the Department of Education and Training to assist in developing strategies to solve problems and make decisions. Individuals within principals' communities of practice and networks can be considered agents within the complex adaptive system within which schools operate (Uhl-Bien, Marion & McKelvey, 2007, p.304). Communities of practice are described by Napoli (2003, p.56) as "groups of people informally bound together by shared expertise". He indicates that such communities of practice can "drive strategies, generate new opportunities, solve problems, and promote the spread of best practices" (Napoli, 2003, p.57). Communities of practice are a valuable resource to principals operating in circumstances far from agreement and certainty. Principals frequently

refer to other principals, particularly those with experience in similar school types or situations, to discuss possible strategies in such situations.

Networks, which Napoli (2003, p.58) describes as “collections of people who may or may not share the same expertise or professional interest but appreciate the dependency they may have on one another” also provide a valuable resource to principals operating on the edge of certainty. Such relationships with stakeholders outside of the organisation provide social networks that can create more diverse choice opportunities (Child, 1997, p.57). Members of the local community provide key networks to assist in making decisions that are appropriate and fit the needs of the wider community. These community networks are vital to decision-making in remote areas or other schools with significant numbers of Aboriginal students as cultural considerations need to be accounted for if any strategy is to be successful.

Brislin (1976, p.16) points out that emic analysis takes account of what the people themselves, in this case school principals, value as meaningful and important. For principals decision-making will include consideration and interpretation of local context such as geographical location, cultural factors, and community requirements. There will be circumstances where this emic analysis will be in conflict with the etic that has been developed centrally. This is more likely to be the case in remote community schools where needs of students and communities differ markedly from those in leafy green metropolitan locations. This inconsistency is similar to that described by Chapman (1997, p.20) in relation to cross-cultural management studies. Chapman indicates that the positivist models referred to in the journals and the modernist philosophical position do not reconcile with the tradition of social anthropology that focused on the emic of the society under consideration.

Calas and Smircich (1999) in their discussion of postcolonial analyses indicate that post structuralism provides a critique of Western epistemology as a system of exclusions. They indicate that many authors writing postcolonial analyses within the modern research paradigm have “been blind to their own ethnocentrism”. In a similar way, it is likely that policy writers developing and writing policy and procedures documents for

use by schools are blind to their assumptions regarding culture. As a consequence, policies may be written that are relevant for schools in metropolitan locations with white Caucasian students from middle class family structures. Whether such policies are relevant in other contexts such as schools within remote Aboriginal communities needs to be questioned. Gubrium and Holstein (2000, p.495) go further, and with reference to Foucault, indicate that discourse can reinforce the existing power/knowledge relationships not allowing other possibilities to appear plausible. As a consequence, principals operating in different contexts may lack empowerment to put forward alternative strategies for dealing with issues that arise in their school communities, even though they may be more appropriate given the circumstances. It is under these conditions that principals may be more likely to contemplate taking risks in their decision-making.

The difficulty of making decisions based on the assumption that initial conditions are defined by and limited to those determined in central office becomes clear. The initial conditions in each school and each decision-making circumstance are likely to be unique, even if only in small, indiscernible ways. But the thinking of complexity theory indicates that even the smallest change in initial conditions within a dynamic system can result in unpredictable and chaotic outcomes. When initial conditions such as personality and views of a student, their family circumstances and relationships to other community members, wider community response, media intervention, and so on, are taken into consideration it is clear that there is tremendous scope for events to unfold in unpredictable ways. The ABC video (Chaos, 1988) suggests that the use of linear processes and actions in a non-linear dynamic system such as naturally occurring systems in our world will lead to further and greater problems rather than solutions to problems one is currently trying to solve. This view is supported in relation to educational leadership by Eacott (2009, p.4-7), who argues that the complexities and ambiguities of leadership cannot be represented in rigid regulatory frameworks but require understandings and strategies “which actively support innovation”. Such views have significant implications in considering the usefulness of the regulatory framework as a governance mechanism for decision-making in schools.

Lewin (1999, p.198) suggests that "in today's fast-changing business environment, companies will survive only if they are able constantly to adapt and evolve through operating optimally as a complex adaptive system". He goes on to point out that this requires a change from the mind-set that managers can control their organisations to one where they can influence where the company is going and how it evolves. Despite this, the influence of Taylorism (Lewin, 1999, p.200) remains the dominant influence today, with the machine model of business embodied in a command and control style of management. This form of management may be appropriate when goals are clear and there is little uncertainty in the prevailing business environment (Lewin, 1999, p.201), however Lewin argues (1999, p.202) that through encouragement of diversity and distributed control, creativity and adaptability can be achieved and that people will self-organise around problems that need to be solved.

Chapter 1 referred to the *Plan for Government Schools 2004-2007* which outlined the core values of the organisation, the overall objective and subsidiary objectives that the organisation seeks to achieve. These values and objectives are used to provide a measure of successful outcomes for the organisation. However, such core values and goals may also serve another purpose within the complexity analogy. That is, they may serve as attractors or strange attractors within the dynamic system of government schools. Whiteley, A (2003, p.18) argues that such governing rules will pull people inside the boundary of governing values. So in this case, although principals may be free to make decisions reflecting the context of their school they would be doing this within the boundary of the governing values and the stated objectives of the organisation as a whole.

Models of risk and studies of risk-taking have focused largely on the relationship of the defined risks and returns or profits within a given firm (Bowman, 1980, p.18). In this context, risk is the concept that captures the uncertainty associated with the outcome. Models of risk and both utility (Bell, 1995) and agency (Carpenter, Pollock & Leary, 2003) theory make an assumption of consistent choice across risk-related problems. Individual characteristics of the managers who are making decisions and the context of the decision-making environment and of the particular problem to be solved are not considered. March and Shapira (1987) conclude from their analysis that managers

take risks but that the decision-making processes used are quite different from the classical processes of choice among alternative outcomes with defined probability distributions. These distributions are not readily able to account for principals' prior knowledge, experience and values which are important factors in the decision-making process.

Hambrick and Mason (1984) discuss how strategic decisions are impacted by the idiosyncrasies of the decision-makers. These idiosyncrasies include the decision-maker's knowledge and values, both of which are influenced by the previous experience of the individual. They develop a model of strategic choice in which the decision-maker's cognitive base and values are filtered through their own perceptions of the decision-making situation. Such behavioural models of risk-taking align with the complex adaptive system in which schema are developed, based on past experience and knowledge and decisions made within the boundaries of the governing values shared by the decision-makers. Such models can be useful on the proviso that the users are aware of their underlying assumptions and rather than relying on them indiscriminately, can clearly identify where they may and may not hold (Taleb, 2007, p.251).

Whiteley, A (2003, p.15) and Wheatley (1994, pp.32-43, 65-67; 2006, p.37-45) use the analogy of quantum physics to distinguish between the duality of thinking by people in organisations. The particle self is the positivist side that presents and utilises policy and procedures in the organisation. The wave self is used to represent the creative postmodern side of individual's thinking. In using this analogy it is recognised that human beings in their thinking can take on both forms, just as light can be described as both particles and waves in different contexts. Whiteley, A (2003, p.17) suggests that "organisations that incorporate a 'freedom to become' within the 'responsibility to conform' would be reflecting the quantum characteristics". In the case of school principals, conformity to core values and objectives as outlined in the *Plan for Government Schools 2004-2007*, that also included flexibility to make decisions to achieve these without prescriptive policy mandated for all schools, may incorporate the dual quantum nature in the role of principals in the government school context.

2.10 SUMMARY

Chapter Two has reviewed the literature on risk-taking in decision-making and the impacts of governance, experience and stakeholder characteristics in both business and education contexts. These concepts of governance, experience and stakeholder characteristics will form the basis of a theorised model of risk-taking in decision-making in schools that will be analysed in the methodology of this thesis. Theories and models of decision-making were outlined and their applicability to what is occurring in public sector schools explored.

Chapter Two also reviewed literature related to the philosophical paradigms of modernism, postmodernism and complexity theory and explores how each may assist in interpreting the context of decision-making in a public sector environment. Corporate governance and requirements for regulatory compliance are investigated using these philosophical lenses to provide a way to understand what is occurring when principals engage in risk-taking in decision-making in public schools.

CHAPTER THREE

3 RESEARCH DESIGN

3.1 INTRODUCTION

The discussion in Chapter 2 leads to consideration of a research paradigm appropriate for this study and the ontology and epistemology that will be used as a basis for the research design. In this chapter an outline of the methods is provided. The preliminary data collection and analysis that influenced the development of the research model is described. Further detail about components of the methodology used for the analysis of results is provided in Chapters 4 and 5. The research model and its underlying constructs are developed based on the preliminary data analysis and the literature review, and the research hypotheses presented. The final part of this chapter describes the development of the questionnaire used as the measurement tool in this study.

3.2 THE RESEARCH PARADIGM

3.2.1 Assumptions, Strategy and Rationale

As discussed in Section 2.9, the modernist view has an impact in organisations where it is assumed that ultimate truths exist in relation to policy positions and their impact in a range of contexts. In many organisations, policies and procedures are developed to be followed and complied with by all managers and staff in each branch, geographical location and so on. These are deemed to provide the framework for decision-making regardless of contextual circumstances that apply locally. The existence of governance mechanisms such as the regulatory framework is based on assumptions that are rational and empiricist. Principals of government schools are provided with guidance for their decision-making by centrally developed educational policy and procedures included on the regulatory framework. Policy writers within the central office work under the assumption that policies and procedures can be developed that will apply universally to all schools and circumstances.

The modernist lens assumes that ultimate truths exist in relation to policy positions and their impact will be consistent across a range of contexts. As a consequence of these assumptions, policies and procedures are developed to be followed and complied with by all managers and staff in each school type, in each geographical location without regard to contextual issues such as students' needs or community expectations. The policy and procedures documents are deemed to provide an efficient framework for decision-making regardless of the contextual circumstances that apply locally.

The philosophical basis of this study will therefore be from the perspective of being rather than becoming. The ontology is positivist as it assumed that there is a single reality that can be modeled that will assist in understanding of reasoned risk-taking in decision-making for principals, district directors, central office policy writers and Departmental management of the purpose of policy and how it should be used. An externally defined reality of what the regulatory framework is or was designed to be is relevant to a school situation as this definition is understood or shared by those making decisions on a day-to-day basis within schools.

The theoretical perspective is that of structural functionalism. Both the principals' perceptions of what a regulatory framework should be, and also their perceptions of what its purpose was intended to be by their employer, determine its use in decision-making. Thus, although it is recognised that each principal is an individual with their own essential nature and style, it is assumed that decisions they make are not independent of their social and environmental context. An underlying assumption, is that of anti-humanism, which Saunders (1993) describes as emphasising the social dimension of behaviour and decision-making. In this study it is assumed that the decision-making of principals will need to be understood in terms of the educational context within a Western Australian government school and also the broader social structures that impact on schooling, which will include consideration of the geographical location of the school and also the cultural framework of the community in which it is located.

Decisions are made daily in relation to significant issues and strategic directions. Consideration of modernist views would encourage decision-makers to take account of diverse viewpoints, to consider data, research and other evidence that conflicted with their position on an issue or decision to defend these positions and decisions through logical argument. In practice many principals make decisions that are non-compliant. They make decisions based on consideration of the individual needs of students, their school and local communities in addition to, or in spite of, the requirements of the regulatory framework. The etic/emic contrast (Brislin, 1976, p.16) discussed in Section 2.9, provides an insight into this inconsistency between corporate governance and local decision-making by principals. The regulatory framework and the policies and procedures contained within it have been developed by the organisation with a view to the etic, in that generalisations have been made that are assumed to be applicable to all school contexts and account for all behaviours and circumstances arising in schools. Principals in schools however are making their day-to-day decisions based on the emic.

3.3 RESEARCH METHODS

The research design for this study used a mixed methods approach. Qualitative data and the extant literature have been used to model the complex inter-relationships that impact on risk-taking in decision-making. Then a quantitative approach is used to determine and describe factors impacting on risk-taking in decision-making by principals. Whilst quantitative methods are predominantly focused on a modern perspective that precludes consideration through a postmodern lens, the discussion in Chapter 2 has argued that the two approaches are not incompatible when looked at from the perspective of complexity theory. Complexity theory recognises that mathematical modeling can be a useful tool in simulating the dynamics of organisations and quantitative methods are therefore used to test hypotheses arising from the model and research questions. Measurement and classical mathematical theory are useful tools in assisting in the understanding of reality, but from the postmodern complexity perspective are approximations only. Even in physics, where mathematical models have been of greatest use, history has shown that models, such as Newtonian motion, are only approximations of reality (Halliday, Resnick & Walker, 2007). These models have been subsumed by more precise models, such as the theory of relativity, but Heisenberg's uncertainty principle places a limit on the accuracy of the measurements

that can be made (Williams et al., 1972; Halliday, Resnick & Walker, 2007). Mathematical models are used to help to make sense of the complexity of reality. The model in this study has been developed from the epistemological position of a "bottom up experiment" where the data is used to compare to what we would expect to see using the hypothesised model (Taleb, 2007, p.268). In this study this is in relation to risk-taking in decision-making by school principals. These components are brought together in the final discussion chapter.

The research model presented in Figure 3.1 was developed by identifying key factors through the literature review and the analysis of qualitative data. The main confirmatory data for the study was collected through a survey questionnaire of a larger sample of principals that would enable quantitative analysis. The research design was non-contrived and had minimal impact on the subjects of the study. The constructs included in the model are described in section 3.4.1. Hypotheses are developed in section 3.5.1 based on the research questions.

The research design included seven sequential stages:

1. Analysis of qualitative data collected in a familiarisation study, through semi-structured interviews using a questionnaire pro-forma that allowed principals to self-report on aspects of decision-making and their use of the regulatory framework.
2. Development of a theoretical model based on the literature and qualitative data analysis.
3. Development of a measurement instrument to enable construction of a measurement scale for the constructs identified in the model. Four stages of quantitative analysis were then undertaken to analyse the model and test the hypotheses.
4. Statistical analysis of each of the items on the questionnaire, including demographic variables, using SPSS version 12 (2003).
5. Rasch analysis using RUMM version 2020 (2005) to ensure that the measurement scale was valid and reliable. Cavanagh and Romanoski (Waugh, 2005, p.68) recommend the use of Rasch probabilistic analysis during scale construction to

identify measurement errors due to person and item misfit. They indicate that discarding misfitting items as this stage can minimise error prior to model analysis by structural equation modeling.

6. Exploratory factor analysis using SPSS version 12 (2003) to investigate the correlations of items with the constructs they were designed to measure and to assist in further data reduction.

7. Analysis of the model and testing of the research hypotheses using Partial Least Squares (PLS) version 3 structural equation modeling (Chin, 2001).

The preliminary qualitative data collection undertaken in the familiarisation study and subsequent analysis are described in detail in the following section.

3.3.1 Preliminary data collection and analysis

Preliminary data was collected for this study in a familiarisation phase through face-to-face interviews with principals, district directors, managers of district operations and managers/coordinators of student services in each of 16 district education offices across Western Australia. In addition, interviews were conducted with key stakeholder groups including the State School Teachers' Union of WA, professional associations for primary and secondary school administrators and the parent and community representative body, the WA Council of State School Organisations. This data has been used, in conjunction with the literature review, to develop the research model.

The interviews formed part of a review of the regulatory framework that was conducted in 2003 (Trimmer). The purpose of these interviews and the subsequent analysis was to gain a preliminary understanding of the perceptions of the regulatory framework and its development and to surface underlying issues. The interviews were semi-structured to provide focus, yet simultaneously allow an exploratory conversation regarding the interviewee's perceptions of the regulatory framework.

In undertaking these interviews the researcher was able to maintain a level of independence from the Department. This was possible as she was not an employee of the Department but an officer from the WA Office of the Auditor General on

secondment to conduct an independent review. Establishing status as an independent researcher was significant in encouraging the interview respondents to disclose perceptions regarding the regulatory framework. The semi-structured approach resulted in greater depth and openness of responses than may have been the case if closed and specific questions had been employed. Informal feedback indicated that the researcher was perceived not to have pre-existing or set views about the framework, nor to have the motivation of preserving current policy structures within the Department. This was important in seeking to discover the reality as it existed for the interviewee and assisted in maintaining the position of subservience to the interviewee's voice and reality.

Interviews were held with principals in a sample of 71 schools across the state, and with district directors, managers of district operations (MDOs) and managers/coordinators of student services (CSSs) in each of the 16 district offices in Western Australia shown in Table 3.1. A stratified sample of schools, of approximately four schools per district, was selected on the basis of district, geographical location, school type, and school size. This provided a sample that was representative across districts, geography, school type and size.

Table 3.1: Numbers of interview participants by subgroups

	Country	Metro	Prim	Sec	DHS	RCS	totals
Principals	42	29	30	23	11	6	71
District Directors	10	8					18
District Office Managers	20	13					33
17 MDOs,16 CSSs							

Key: Prim = Primary Schools
Sec = Secondary Schools
DHS = District High Schools
RCS = Remote Community Schools

Interview responses were coded numerically by category of response, or by content for extended response questions, and analysed using Excel. Categories were pre-determined for structured items. For the open response questions tentative categories were created by highlighting phrases that represented particular issues and concepts. These categories were subsequently refined as the analysis progressed. Comparative analysis was conducted by geographical location and school type. There were insufficient schools to allow a valid analysis of responses by district or school size.

In addition, interviews were conducted with key stakeholder groups including the State School Teachers' Union of WA, professional associations for primary and secondary school administrators and the parent and community representative body, the WA Council of State School Organisations. A further questionnaire was developed for use with a sample of 18 key central office staff, including policy writers and reviewers, to establish consistency of understandings held in regard to the purpose of policy within the department and the process for its development. The sample was purposefully selected and included a diverse cross-section of staff involved in the development or review of policy.

A further indicator of principals' perceptions and use of the regulatory framework was provided through attendance at principals' forums in two districts. Taking the opportunity to be involved in group discussions with forums of principals not only enhanced understanding and collection of data but also the understanding of individual principals within the districts and their combined consciousness of how they perceive the regulatory framework and use it to make decisions. These forums therefore provided a level of ontological and educative authenticity in addition to their functional role as a means of data collection.

3.3.2 Research Model and Development of Constructs

The literature review was used to identify key factors from past research and to develop a research model. Analysis of preliminary data, collected through semi-structured interviews using a questionnaire pro-forma that allowed principals to self-report on

aspects of decision-making and their use of the regulatory framework, has also been used in developing the research model in Figure 3.1.

The research model proposes that the independent variables of perception of the governance mechanism of the regulatory framework and stakeholder characteristics impact on the dependent variable of reasoned risk-taking in decision-making for principals. It also proposes that the variable of principal experience moderates the impact of the governance mechanism variable.

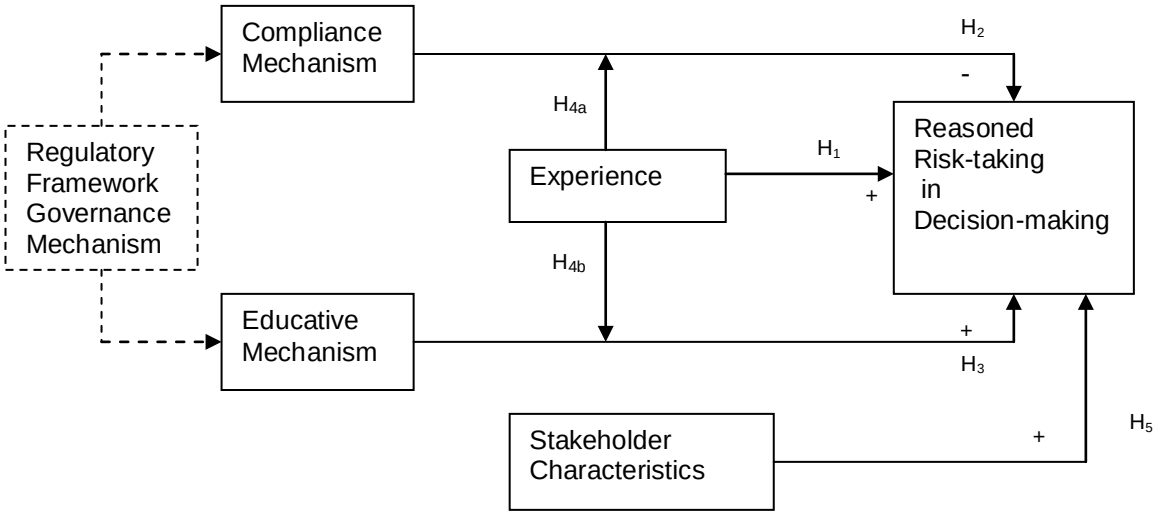


Figure 3.1: Research Model

3.3.2.1 Constructs included in the Research Model

Regulatory Framework Governance Mechanism

The regulatory framework is the collection of policy and procedures documents disseminated to schools from the central office of the Department of Education and Training. Compliance with these instructional statements of policy is mandatory for all staff in government schools in Western Australia. Governance structures can influence how decisions are made (Panova, 2008, pp.76-77).

Compliance Mechanism or Educative Mechanism

In making decisions, the likelihood of managerial risk-taking is impacted by the decision-makers' knowledge and values and their view of the situation as positive or negative (Hambrick & Mason, 1984; Wiseman & Gomez-Meija, 1998). Singh (1986) argues that the extent of control through level of delegation of authority is also a relevant factor. In the context of schools, principals' knowledge and their perception of the purpose and value of the governance mechanism of the regulatory framework, and their authority to make decisions, will impact on their decision-making.

Sitkin and Pablo (1992) posit that the focus of the organisation's control system, on either process or outcomes, impacts on perceptions of risk and hence decision-making behaviour. They argue that control systems that focus on the process by which decisions are made lead to perceptions of lower risk whereas those that focus on outcomes, ignoring how the decision was made, lead to perceptions of higher risk. In the government school context, the compliance view of the regulatory framework focuses on process, whereas an educative view focuses more on assisting a principal to achieve an appropriate outcome.

The 2003 Department of Education review (Trimmer, p.12) found that 73% of principals perceived the framework as an educative tool to provide advice, instruction, guidance and clarification to assist with decision-making. In contrast to this view, other principals considered the regulatory framework to be a compliance mechanism. Notwithstanding their perception of its purpose, 47% of principals indicated that they saw it to be their responsibility to ensure compliance with the framework in schools and to implement its instructions (Trimmer, 2003a, p.35).

The review also found that there was a diversity of views held by policy writers and reviewers within central office in relation to the purpose of policy within the Department. The most common views referred to setting of mandatory requirements and boundaries, and compliance with these. However, there was also an educative view that policy should be enabling rather than restrictive, through provision of a structure of

common goals and support and guidance for achievement of these (Trimmer, 2003a, p.13).

The information regarding principals' perceptions of the purpose of the regulatory framework in the 2003 report of the *Review of the Regulatory Framework* was based on responses to the following questions included in the *Regulatory Framework Questionnaire for Principals* administered in 2002:

- "*What is your perception of the purpose of the regulatory framework as it currently exists in the Department"*
- *"For what purpose have you used it or referred to it? If not, why not?"*
- *"What purpose do you think a regulatory framework should serve?"*
- *"Would this assist you more in your role as principal? How?"*
- *"What do you see as your responsibilities in relation to the regulatory framework?"*

Experience

Carpenter, Pollock and Leary (2003) found that decision-making was impacted by previous experience, with individual risk-taking more likely where management had relevant experience. Wiseman, Gomez-Mejia and Fugate (2000) indicated that this was because differing levels of experience can effect expectations related to magnitude and probability of loss associated with taking a particular risk. The rationale being that the greater a manager's experience and past success with dealing with an action, the less uncertainty that manager will have regarding the likely outcome of taking the action, and the more reasonable the risk will seem. In the context of schools, experienced principals are likely to have had the opportunity to be involved in decision-making situations in the past that will reduce their uncertainty and inform their future decision-making. Experienced principals would therefore have greater propensity to engage in risk due to their reduced uncertainty and a perception of risk based on greater knowledge of similar situations. Conversely, new and acting principals, who have limited experience, would be more likely to refer to and comply with the regulatory framework as a guide to their decision-making in situations of risk.

As discussed in the literature review (Sitkin & Pablo, 1992), it is hypothesised that there is an interaction effect between organisational governance systems and the individual risk-taking propensity of principals. In the context of this research model, this experience is modeled as a moderating variable. Within this view, principals with high risk-taking propensity and an educative view of the regulatory framework should be more likely to make reasoned risk decisions as it will assist them to achieve identified outcomes. Whereas, risk averse principals with a compliance view would have less incentive to take risks in decision-making.

The 2003 Department of Education review (Trimmer, p.34) found that there were differences in perceptions regarding the usefulness of policy and procedures in decision-making between groups of principals. Experienced principals, and more frequently secondary principals, indicated that they would prefer greater flexibility to make decisions at the school level to meet outcomes that took account of local circumstances. These principals expressed preference for provision of minimal mandatory policy that specified outcomes to be achieved as opposed to prescribed procedures. They indicated that their professional expertise would provide a sound basis for meeting these outcomes in a manner that was better suited to the local community. Conversely, primary principals and new or acting principals were more likely to express a preference for clearly documented policy and procedure to provide guidance and assist them in the decision-making process.

The information regarding principals' experience and their perceptions of the usefulness of the regulatory framework in the 2003 report of the *Review of the Regulatory Framework* (Trimmer) was based on records of discussions in principals' forums in 2002.

Stakeholder Characteristics

Studies by Carpenter, Pollock and Leary (2003) and Carpenter and Westphal (2001) examined the critical role of stakeholders in reasoned risk-taking and strategic decision-making. Beatty and Zajac (1994) have argued that influential stakeholders encourage risk-taking by managers. In the context of decision-making by school principals the

stakeholders include parents and community members in the school locality. Where a school is located in a community that differs from the norm, the expectations and needs of the community are more likely to be unique to that particular community. Differences could be due to factors including geographical location or cultural influence such as would occur in remotely located communities. The expectations and needs of such a community are less likely to align well to policies that have been developed centrally to apply to generally applicable circumstances. It is therefore posited that there will be greater influence on principals from the parent and community stakeholders in these communities to take risky decisions in order to meet their differing needs and expectations.

The report *Investing in Government Schools: Putting Children First* (Robson, Harken & Hill, 2001, p.36, 97) found that administration through system-wide management policies does not recognise the diversity that exists across districts. This view was supported by the 2001 study by Cummings and Stephenson. Evidence from principals' responses in the 2003 review (Trimmer, p.34) emphasised the diversity that exists between geographical locations and types of schools, with principals needing the flexibility to make decisions that take account of local school and community circumstances, including geographical and cultural factors.

Reasoned Risk-taking in Decision-making

Risk-taking is defined to occur when decisions are made that are not compliant with the regulatory framework, the primary governance mechanism for public schools in Western Australia. Decisions contrary to the regulatory framework involve risk as when negative outcomes arise from decision-making, principals may be exposed to criticism or disciplinary action for non-compliance with established policy.

Policy and procedures included within the regulatory framework are mandatory. However, the 2003 review found that only six percent of principals indicated that they would always comply with policy in all circumstances (Trimmer, p.30). Seventy percent of principals indicated that they were aware of instances where compliance had not been possible given the circumstances (Trimmer, 2003a, p.32). These principals

indicated that they used professional discretion to make decisions that took account of local circumstances, including geographical and cultural factors. Twenty percent of principals indicated that there were no policies currently constraining activities in schools and so had never experienced circumstances where compliance was problematic (Trimmer, 2003a, p.30). Principals indicated that they worked around constraints as best they were able. However there was concern expressed that teachers and principals were put into a vulnerable position by policies where they could not comply. Restricted flexibility in decision-making was of particular concern in senior colleges, agricultural colleges with residential students, and remote community schools where the population of students or the community had significantly different characteristics than other schools (Trimmer, 2003a, p.31).

The information regarding principals' perceptions of the purpose of the regulatory framework in the 2003 report of the *Review of the Regulatory Framework* were based on responses to the following questions included in the *Regulatory Framework Questionnaire for Principals* (Trimmer) administered in 2002:

- *"Are there any policies or procedures that are constraining activities in schools?"*
- *"Are you aware of any instances where compliance was impossible given the circumstances so that professional discretion had to be used to make decisions that were contrary to the policy and procedures in the framework? What were the circumstances?"*

3.4 RESEARCH QUESTIONS AND DEVELOPMENT OF HYPOTHESES

As described in Chapter 1, the purpose of this study was to determine whether reasoned risk-taking by school principals is a consequence of their perceptions of the governance mechanism of the regulatory framework, the experience of principals and the characteristics of key stakeholders within the school community.

The research questions for this study are:

1. Does principal perception of the regulatory framework impact on the principals' decision-making process within the school?
2. Does the level of experience of school principals impact on their likelihood to engage in reasoned risk-taking in decision-making?
3. Do stakeholder characteristics for communities and schools impact on risk-taking in decision-making by principals?

These research questions are now developed into testable hypotheses.

3.4.1 Development of Hypotheses

Five hypotheses were developed to address the research questions and analyse the model presented in Figure 3.1. The literature that underpins the development of each of these hypotheses was discussed in Chapter 2 and the previous sections of this chapter.

Hypothesis 1: More experienced principals will tend to engage in risk-taking behaviour more frequently than new or acting principals.

Hypothesis 2: Where school principals interpret the governance mechanism of the regulatory framework as a compliance mechanism there will be a negative relationship to reasoned risk-taking.

Hypothesis 3: Where school principals interpret the governance mechanism of the regulatory framework as an educative mechanism there will be a positive relationship to reasoned risk-taking.

Hypothesis 4: There will be an interaction effect between perception of the regulatory framework and experience. **(a)** The relationship between the compliance mechanism and reasoned risk-taking is moderated negatively by the experience of principals.

(b) The relationship between the educative mechanism and reasoned risk-taking is moderated positively by the experience of principals.

Hypothesis 5: Principals of schools with a high degree of uniqueness in the characteristics of key stakeholders within the communities will be more likely to make decisions involving reasoned risk-taking.

3.5 DEVELOPMENT OF QUESTIONNAIRE

Measurement items were developed for this study for each of these identified constructs which are included in the research model in Figure 3.1. Measurements in existing studies relate to business environments and were judged not to be transferable to an educational context. A survey questionnaire was developed to measure the constructs included in the research model. Cavanagh, Kennish and Sturgess (2008) discuss the difficult nexus in positivist research of developing a hypothesised model or a theoretical framework that is then used to underpin the construction of measuring instruments, where that instrument is subsequently used to test the assumptions underlying the theoretical framework. Whilst this limitation is acknowledged, it is an unavoidable complexity in exploratory research where there are not pre-established measurement instruments.

For each of the constructs in the research model, measurement items were developed with reference to the literature discussed in Chapter 2 and the findings from the preliminary research described in section 3.3.1. Table 3.2 below details the references supporting each of the measurement items. The design of the questionnaire and development of items utilised findings from research in measurement theory, to structure the items and the response scales to measure constructs in the model.

A series of 9 demographic items were included at the beginning of the questionnaire. Studies have shown that gender is a significant variable in measuring openness to change (attitude) and willingness to participate (behavioural dimension) in school reform (Dunham et al., 1989; Huang, 1993; Hogue & Lord, 2007). Education level, experience in education and age were other demographic variables included in the Dunham study. Other demographic items included information to determine environmental and situational factors that could potentially impact on responses. These included factors such as the experience and expertise of the principal in regard

to length and type of teaching and administrative experience and the type and size of school. The geographical location and ethnic composition of the school were also included as factors likely to influence the construct of "Stakeholder Influences" (Dunham et al., 1989).

The items in the questionnaire provide measures of principals' attitude in relation to the concepts included in the model and also measures of their behaviour. Andrich and Styles (1994) have posited that "attitude and behaviour are manifestations of the same continuum, but at different levels of intensity". They argue that attitude and behaviour for statements fall on the same measurement continuum with behaviour statements at the higher end as they are harder items to agree to. An unfolding measurement model (Thurstone, 1928; Andrich & Luo, 1993) has been used to analyse responses to statements concerned with attitude and behaviour. The unfolding measurement model differs from the monotonic function of the cumulative model, that is used in this analysis, in that it is a single peaked function that provides an "ideal point" that indicates the point on the scale that measures the attitude of an individual on the particular latent trait (Andrich & Styles, 1994, p.2, 7). The individual would therefore be expected to agree with statements on the scale below this point and to disagree with statements above it.

Andrich and Styles (1994, p.3) argue that the use of statements scored in the Likert tradition, which requires reverse scoring of half of the statements, complicates the location of the statements on the continuum. They propose use of a model for unfolding data which locates persons and statements simultaneously on a continuum without the requirement for reverse scoring. The model proposed (Andrich & Styles, 1994, p.7) for dichotomous items has also been shown to be generalisable to the case of Likert style items with more than two ordered categories (Andrich, 1993a). The addition of more categories within a semantic space has been shown to affect the precision of the measurement but not the estimate of the location of the item on the measurement scale (Andrich, 1993b). The scales used in the questionnaire for this study will use four point response scales with formats as used by Andrich and Styles (1994, p.10). The response format for items measuring attitudes of principals used the categories: *Strongly Agree, Agree, Disagree, Strongly Disagree*. The response format

for items measuring the behaviour of principals used the categories: *Always, Often, Occasionally, Never*. The wording of the response sets is different to clarify the meaning for respondents. However, this may have introduced a limitation in making direct comparisons between the two item sets. Waugh (2005, 2010) indicates that the same items and categories should be used to measure both attitude and behaviour.

Likert scales often use an Undecided or Neutral category as a central point between the Agree and Disagree categories. However, measurement research (Andrich, DeJong & Sheridan, 1994) on the use of this category has suggested that when placed on a continuous scale such a category does not behave as a category between these other two categories. Therefore the items included in the questionnaire for this study do not include a neutral middle category.

Andrich and Styles (1994, p.14) also hypothesised that traditionally developed Likert style items would be located at the extremes of the continuum of the measurement scale with a gap in the middle. Their analysis confirmed this hypothesis. To overcome this, they suggest that more ambivalent statements should be included in questionnaire design that cover this gap in the measurement scale (Andrich & Styles, 1994, p.16,17). These items may acknowledge contradictory ideas that need to be negotiated in selecting the response. Such items have been included in developing the questionnaire for this study.

Table 3.2 indicates the references and other sources used to develop the questionnaire items for each identified issue related to the constructs in the hypothesised model. Refer to Appendix 2 for the full questionnaire.

Table 3.2: Framework for Development of Questionnaire

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
Compliance Mechanism	Level of delegation Authority/ control over decision-making process	The principal is accountable for ensuring that decisions are made in line with the *School Education Act and Regulations* and policy included in the regulatory framework.	(Deci & Ryan 1987) (Hambrick & Mason 1984) (Singh 1986) (Trimmer 2003a) (Trimmer 2003b) (Wiseman & Gomez-Mejia 1998)
		The regulatory framework constrains me in my role of principal in making decisions that meet the needs of this school and its students.	(Singh 1986) (Trimmer 2003a) (Trimmer 2003b) (Wiseman & Gomez-Mejia 1998)
		Compliance with centralised policy in the regulatory framework constrains me from making the most appropriate decisions to meet the local needs of this school	(MacNeill & Silcox 2006) (Singh 1986) (Trimmer 2003a) (Trimmer 2003b) (Wiseman & Gomez-Mejia 1998) Feedback from pilot of the questionnaire
		As principal, I have control over decision-making in the school.	(Deci & Ryan 1987) (Hambrick & Mason 1984) (Reeve, Nix & Hamm 2003) (Vlek & Stallen 1980)
		The consequences of decisions made in line with the regulatory framework are beyond my control.	(Deci & Ryan 1987) (Reeve, Nix & Hamm 2003) (Vlek & Stallen 1980)
		Principals have the authority to choose the appropriate course of action for the circumstances in their school.	(Deci & Ryan 1987) (Hambrick & Mason 1984) (Singh 1986)
		Authority to make decisions is delegated to principals.	(Deci & Ryan 1987) (Hambrick & Mason 1984) (MacNeill & Silcox 2006) (Singh 1986) (Trimmer 2003a) (Trimmer 2003b)
	Focus of governance framework on process and compliance	The purpose of the regulatory framework is to assure compliance by schools to established policies and procedures.	(Deci & Ryan 1987) (Trimmer 2003a) (Trimmer 2003b) (Wiseman & Gomez-Mejia 1998)

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
		In making decisions I refer to training/PD I have had about interpreting and applying the regulatory framework.	(Libby & Fishburn 1976) (Sitkin & Pablo 1992) (Wiseman & Gomez-Mejia 1998)
		It is important that principals in all schools are making consistent decisions.	(Libby & Fishburn 1976) (Sitkin & Pablo 1992) (Trimmer 2003a) (Trimmer 2003b)
		When making decisions I try to comply with what I believe the Department would prefer me to do.	(Libby & Fishburn 1976) (Sitkin & Pablo 1992) (Whiteley A 2004)
		In making decisions I am obligated to comply with courses of action prescribed in the regulatory framework.	(Deci & Ryan 1987) (Sitkin & Pablo 1992) (Trimmer 2003a) (Trimmer 2003b)
		I feel pressured to always make decisions in line with the regulatory framework.	(Deci & Ryan 1987) (Reeve, Nix & Hamm 2003) (Wiseman & Gomez-Mejia 1998)
		I am concerned about the possibility of personal litigation if I do not comply with all of the policy and procedures in the regulatory framework	(Wirtz, Cribb & Barber 2005)
		Making decisions in line with the regulatory framework assures that they can be publicly and legally defended regardless of the outcome of the decision.	(Wirtz, Cribb & Barber 2005) Feedback from pilot of the questionnaire
Educative Mechanism	Focus of governance framework on outcomes and provision of assistance to enable decision-making	The purpose of the regulatory framework is to provide advice, instruction, guidance and clarification to assist with decision-making.	(Deci & Ryan 1987) (Hambrick & Mason 1984) (Sitkin & Pablo 1992) (Trimmer 2003a) (Trimmer 2003b) (Wiseman & Gomez-Mejia 1998)
		I refer to the regulatory framework to assist in making decisions that achieve outcomes for students, the school and community.	(Deci & Ryan 1987) (Hambrick & Mason 1984)
		I often use the non-mandatory information and guidelines, in addition to mandatory policy and procedures, to assist in making decisions.	(Sitkin & Pablo 1992) (Trimmer 2003a) (Trimmer 2003b)

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
		The regulatory framework assists me in my role of principal to make decisions that meet the needs of this school and its students.	(Hambrick & Mason 1984) (Sitkin & Pablo 1992) (Trimmer 2003a) (Trimmer 2003b) (Wiseman & Gomez-Mejia 1998)
		I am satisfied that the policies in the regulatory framework support outcomes I want to achieve in this school.	(Deci & Ryan 1987) (Hambrick & Mason 1984) (Sitkin & Pablo 1992)
Experience	Length of experience Relevance and type of experience	How long have you been employed in the role of principal?	(Carpenter, Pollock & Leary 2003) (MacCrimmon & Wehrung 1990) (Trimmer 2003a) (Trimmer 2003b) (Wiseman, Gomez-Mejia & Fugate 2000)
		How long have you been employed as a teacher/school administrator?	(Carpenter, Pollock & Leary 2003) (MacCrimmon & Wehrung 1990) (Trimmer 2003a) (Trimmer 2003b) (Wiseman, Gomez-Mejia & Fugate 2000)
		Do you hold the role of principal substantively?	(Soane & Chmiel 2005) (Trimmer 2003a) (Trimmer 2003b) (Wiseman, Gomez-Mejia & Fugate 2000)
		School Type	(Trimmer 2003a) (Trimmer 2003b)
		When making decisions I refer to past experience where I have made decisions about similar situations.	(Bacic, Bregt & Rossiter 2006) (Carpenter, Pollock & Leary 2003) (Franken & Muris 2004) (Libby & Fishburn 1977) (Wiseman, Gomez-Mejia & Fugate 2000)
		I have a lot of experience in making decisions as a school leader.	(Carpenter, Pollock & Leary 2003) (Franken & Muris 2004) (Libby & Fishburn 1977) (Trimmer 2003a) (Trimmer 2003b) (Wiseman, Gomez-Mejia & Fugate 2000)

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
		My capacity to make decisions was a key criterion in being selected for this position as principal.	(MacCrimmon & Wehrung 1990) (Soane & Chmiel 2005)
		I don't have a great deal of experience in making decisions as a principal.	(Carpenter, Pollock & Leary 2003) (Franken & Muris 2004) (Libby & Fishburn 1977) (Trimmer 2003a) (Trimmer 2003b) (Wiseman, Gomez-Mejia & Fugate 2000)
	Past success in risk-taking	When I have made decisions that were contrary to the policy and procedures in the framework I have been able to meet the outcomes I was trying to achieve.	(Wiseman, Gomez-Mejia & Fugate 2000) (Trimmer 2003a) (Trimmer 2003b)
		When I have made decisions that were contrary to the policy and procedures in the framework there have been repercussions from district or central office to sanction my decision.	(Carpenter, Pollock & Leary 2003) (Wiseman, Gomez-Mejia & Fugate 2000)
		In my experience, I have found that I am best placed to make decisions concerning my school.	(Franken & Muris 2004)
		In my experience, I have found that centrally made policies are not always appropriate to local circumstances.	(Carpenter, Pollock & Leary 2003)
		Taking account of the experience of myself and other principals I know in similar situations is as important as the stated policy in making decisions about individual cases.	(Carpenter, Pollock & Leary 2003) (Wirtz, Cribb & Barber 2005)
		I have had positive feedback from Directors about my decision-making.	(Carpenter, Pollock & Leary 2003) (Wiseman, Gomez-Mejia & Fugate 2000)
		I have been disciplined or chastised by a Director regarding a decision I have made.	(Carpenter, Pollock & Leary 2003) (Wiseman, Gomez-Mejia & Fugate 2000)
Stakeholder Characteristics	Geographical location of school	District	(Robson, Harken & Hill 2001) (Trimmer 2003a) (Trimmer 2003b)
		Rural/remote location of school.	(Cummings & Stephenson 2001) (Robson, Harken & Hill 2001) (Trimmer 2003a) (Trimmer 2003b)

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
	School size	School size (number of students)	(Cummings & Stephenson 2001) (Trimmer 2003a) (Trimmer 2003b)
	Diversity of cultural composition of school community	The proportion of students at this school who are of Aboriginal or Torres Strait Islander descent.	(Cummings & Stephenson 2001) (Robson, Harken & Hill 2001)
		The proportion of students at this school who are from culturally and linguistically diverse backgrounds.	(Cummings & Stephenson 2001) (Robson, Harken & Hill 2001)
	Diversity of cultural composition of school community Stakeholder input	The characteristics of this school community are very different from other schools I have experienced.	(Bacic, Bregt & Rossiter 2006) (Carpenter, Pollock & Leary 2003)
		I could not be certain about the preferences of the school community in all circumstances.	(Bacic, Bregt & Rossiter 2006)
		Parents and community members frequently ask questions or raise concerns about policy and procedures with me.	(Beatty & Zajac 1994) (Carpenter, Pollock & Leary 2003) (Trimmer 2003a) (Trimmer 2003b)
		Parents and community members frequently have input into the decision-making processes about issues arising in the school.	(Beatty & Zajac 1994) (Carpenter, Pollock & Leary 2003) (Trimmer 2003a) (Trimmer 2003b) (Carpenter & Westphal 2001) (Trimmer 2003a) (Trimmer 2003b)
		I seek input from the community as I have an incomplete understanding of their needs.	(Bacic, Bregt & Rossiter 2006) (Cummings & Stephenson 2001)
		The needs of this school community are unique.	(Cummings & Stephenson 2001) (Robson, Harken & Hill 2001) (Trimmer 2003a) (Trimmer 2003b)
		My decision-making in this school is influenced by the geographical location of the school.	(Cummings & Stephenson 2001) (Robson, Harken & Hill 2001) (Trimmer 2003a) (Trimmer 2003b)

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
		My decision-making in this school is influenced by the cultural composition of the community.	(Robson, Harken & Hill 2001)
Reasoned Risk-taking in Decision-making	Decisions made that are contrary to the policy and procedures in the regulatory framework	There have been instances where compliance with the framework was impossible given the circumstances so that I had to use professional discretion to make decisions that were contrary to stated policy or procedures.	(Trimmer 2003a) (Trimmer 2003b)
		I do not comply with policies or procedures that I believe are constraining activities in my school.	(Trimmer 2003a) (Trimmer 2003b)
		I refer to the regulatory framework after I have made a decision to check whether it complies with stated policies.	(Trimmer 2003a) (Trimmer 2003b)
		There have been instances where I have made a decision that met the general intent of a policy but where for some reason, such as in the best interest of a student(s), the detailed mandatory procedures were breached.	(Soane & Chmiel 2005) (Trimmer 2003a) (Trimmer 2003b)
		There have been any instances where I had to use professional discretion to make a local decision that breached the relevant policy or procedures as they did not allow flexibility to deal with the circumstances of the particular case or issue.	(Soane & Chmiel 2005) (Trimmer 2003a) (Trimmer 2003b)
		Making decisions that involve risk is necessary to get ahead and gain promotion.	(MacCrimmon & Wehrung 1990)
		Effective decision-making that meets the needs of the school and community requires principals to take responsibility for taking risks.	(Trimmer 2003a) (Trimmer 2003b)
		Strategic risk-taking is essential to meet the outcomes expected of principals and schools.	(Baird & Thomas 1985) (MacCrimmon & Wehrung 1990) (Soane & Chmiel 2005)
		I never make decisions that are contrary to the regulatory framework.	(Trimmer 2003a) (Trimmer 2003b)
		I feel pressured to make decisions in line with the regulatory framework even when I don't believe it will achieve the best result.	(Deci & Ryan 1987)

Construct	Key Issues from Literature/ Past research	Proposed Items for Survey Questionnaire	Reference/Source
		If the experience of myself and other principals I know in similar situations indicates a decision should be made contrary to the stated policy I will make a decision that aligns with that experience rather than the regulatory framework.	(Wirtz, Cribb & Barber 2005)
		Making decisions that can be publicly and legally defended is more important than the content of the decision.	(Wirtz, Cribb & Barber 2005)
		I have used professional discretion to make decisions that don't comply with stated policy or procedures on matters not related to students such as maintenance, finance and purchasing.	(Trimmer 2003a) (Trimmer 2003b) Feedback from pilot of the questionnaire
		I have used professional discretion to make decisions that don't comply with stated policy or procedures on matters related to staff such as relief, performance management and substandard performance.	(Trimmer 2003a) (Trimmer 2003b) Feedback from pilot of the questionnaire

The survey questionnaire was piloted with a small sample of principals from both metropolitan and remote primary and secondary schools. Fifteen principals were approached, of which 11 agreed to participate. After completing the questionnaire these principals provided feedback in a half hour phone interview regarding their overall reaction to the questionnaire and instructions, and a question by question analysis to determine if each item was measuring what it was intended to measure. The principals were also asked whether there were any critical issues related to decision-making that they felt had been omitted in the questionnaire or any factors that promoted risk-taking in their decision-making that they felt were not adequately covered. Amendments were made to questions based on this feedback. Detailed description of the pilot of the questionnaire and subsequent amendments is provided in Chapter 4.

The questionnaire consisted of nine demographic questions and 49 statements: 35 items measuring attitude and 14 items measuring behaviour of principals in relation to the constructs included in the research model. Twenty-two of the statements were

framed positively in relation to the latent trait of risk-taking in decision-making and 13 were framed negatively. Statements framed positively reflect a positive attitude toward risk-taking in decision-making, whereas statements framed negatively reflect a risk-averse attitude in decision-making. Demographic information regarding the principal and the school was requested at the beginning of the questionnaire. The attitude statements were presented next with positive and negative statements mixed. The behaviour statements were then presented together at the end of the questionnaire. This ordering was selected as in creating a Rasch scale it is usual to conceptually order the items from easy to difficult before collection of the data (Waugh, 2005, 2010). As this is questionnaire was constructed specifically for this study and therefore has not been used previously, it has been assumed that the attitudinal items will be less difficult than the behavioural items as discussed in Section 3.5.

The refined version of the survey questionnaire was then used to collect confirmatory data to analyse the research model. A stratified sample of schools, of four schools per district, was selected on the basis of district, geographical location, school type, and school size. The sample was selected to be representative across districts, geography, school type and size at a 95% confidence level. A larger random sample was identified so that further principals could be contacted within each of the identified strata if required dependent on the response rate. The maximum number of items used to measure a construct within the research model was also considered in determining the sample size. This additional sample was utilised and the final sample size was 253 principals to meet these requirements.

The collected data were analysed using multivariate data analysis tools to analyse the research model. The data analysis undertaken involved four procedures:

1) An analysis of the descriptive statistics based on demographic data using SPSS version 12 (2003);
2) A Rasch analysis to explore the psychometric properties of the measurement instrument conducted with RUMM version 2020 (2005);

3) An exploratory factor analysis for each of the constructs in the hypothesised model using SPSS version 12 (2003) to investigate the correlations of items with the constructs they were designed to measure; and
4) Partial Least Squares (PLS) based structural equation modeling version 3.0 (Chin, 2001) to test the hypotheses.

The sample of respondents was required to be ten times the largest number of items to measure any formative construct, or the largest number of antecedent constructs leading to an endogenous construct (whichever is greater), within the model to be sufficient to meet the requirements for using PLS structural equation modeling. This tool also provided the advantage of allowing analysis of all paths simultaneously for each of the dependent variables included in the research model.

3.6 SUMMARY

This chapter considered the assumptions and rationale of the research paradigm for this study and how this linked to the philosophical positions discussed in chapter 2. The research design was outlined and the research model and associated constructs were developed. The following chapter provides a detailed description of the methods used for testing the proposed hypotheses and presents the results of the analyses conducted using these methods.

CHAPTER FOUR

4 PILOT STUDY AND RASCH ANALYSIS[2]

4.1 INTRODUCTION

In the next two chapters the results of the quantitative phase of the study are presented. This chapter outlines the process of conducting the pilot study, the feedback obtained from participants and adjustments made to the final questionnaire as a consequence of this feedback. The chapter then proceeds to discuss administration of the finalised questionnaire, the response rate and each of the first three stages of the quantitative analysis of the results. Results discussed include descriptive statistics conducted in SPSS; Rasch analysis to develop a robust measurement scale; and exploratory factor analysis to confirm constructs included in the model described in the previous chapter. Structural equation modeling to analyse the proposed model and hypotheses is discussed in Chapter Five.

4.2 PILOT STUDY

A letter outlining the purpose of the study and requesting participation in the pilot of the questionnaire was sent to a sample of 15 principals in a range of school types including an early childhood education centre, primary schools, high schools, senior high schools, district high schools, a senior college, and an education support centre. The schools were located across metropolitan, rural and remote areas.

Consent forms (see Appendix 3) to be involved in the pilot were returned by twelve principals. One of these principals indicated on the consent form that he would not take part in the survey but provided consent to use data collected from him in the preliminary qualitative phase of the study conducted earlier.

[2] Findings from this chapter have been presented and published by the researcher in:

'Sequential use of Rasch analysis and structural equation modeling to investigate reasoned risk-taking in decision-making by school principals', *Proceedings of the 15th International Objective Measurement Workshop,* 28-29 April 2010, Boulder, Colorado.

Copies of the questionnaire were then sent to the eleven principals who had provided their consent to participate in the pilot and a completed questionnaire was received from each. In the letter accompanying the questionnaire, principals were requested to take a photocopy of their responses and return the completed original in the reply paid envelope provided. This ensured they had a copy of their responses at hand when the researcher later contacted them by phone to discuss the survey and gain their feedback. Telephone feedback sessions conducted with each principal covered the following four points and took approximately thirty minutes each.

- Overall reaction to questionnaire and instructions.
- Question by question analysis to determine if items were measuring what they were intended to measure.
- Question – "Are there any critical issues related to decision-making that you feel have been omitted in the questionnaire?"
- Question – "Are there any factors that promote risk-taking in your decision-making that you feel are not adequately covered in the questionnaire?"

4.2.1 Overall reaction to questionnaire and instructions

The overall response to the questionnaire was very positive. Respondents commented that they felt comfortable answering the questions and found the questionnaire non-invasive even though it was dealing with sensitive subject matter. The independence of the research was considered to be important in this and also that the responses were going to be kept confidential and not become the property of the Department. Utilising a post office box address for return of the completed questionnaires directly to the researcher was an important aspect of maintaining independence.

Respondents also indicated that they found the topic engaging and the questions interesting to respond to. However, two respondents indicated that they felt that they contradicted themselves in some responses and would have liked to have a free response section included to provide an explanation of why this occurred. One of these respondents expressed this as that they "struggled with a range of possible responses" and "wanted to have a conversation about it".

Respondents indicated that the purpose of the questionnaire and the language used was clear and not ambiguous. However, three respondents indicated that it was difficult to think of specific examples on the spot when completing the questionnaire. They suggested that some commonly used policies be cited in a short introduction or preamble to assist in bringing relevant examples of policies to mind, so that principals were "not coming in cold". Examples of policies where principals were more likely to be placed in a position to consider taking risks were cited. It was also pointed out that the preamble should be short so that principals could understand what was being looked for but would not be leading.

Respondents gave details of actual examples, the circumstances in which they had taken risks and the factors that had impacted on their decision-making. These related to a range of regulatory framework policies including: maintenance; purchasing and finance; enrolments; excursions; duty of care; behaviour management and discipline; school councils; payment of relief teachers; performance management of staff; and management of substandard performance.

4.2.2 Feedback on questionnaire items

Principals provided feedback on individual items included in the questionnaire. The question by question analysis was undertaken to determine if items were measuring what they were intended to measure. This feedback from the pilot principals is provided below.

(NB: question numbers below refer to the pilot questionnaire which is included at Appendix 2)

Question 14 – Agreed, but not a great deal, would like capacity to respond with an open ended proviso.

Question 24 – Respondents who had strongly agreed with question 19 indicated that they would agree that they saw this as a purpose but would disagree that it was the main purpose of the regulatory framework. They suggested that the distinction between the purpose as compliance or educative be clarified through inclusion of "main" and a caveat of "not compliance but…" in the stem of this question.

Question 25 – A need to clarify “assists” to indicate that the regulatory framework does not control decision-making.

Question 30 – Disagree with regard to own role, but pointed out that others also have the capacity to make decisions, so more context required.

Question 35 – Noted that there is often difficulty experienced in engaging the school council and community.

Question 36 – Noted that parents and community members are often not aware of their rights and therefore do not question procedures of the school with the exception of the matter of suspension of students.

Question 37 – Noted that there are a core of parents that are consulted as they are supportive of and take an interest in the school. Therefore the school has constructed ways to include their input into decision-making.

Question 38 – Query whether this question means “different from mainstream schools”.

Question 47 – Respondents indicated that it needed to be clarified whether they were answering from their own personal perspective or their view of the Department of Education and Training’s perspective, as their response may differ.

Question 49 – Should include the word “consciously” so that it refers to a deliberate action.

Question 53 – One respondent indicated that as they never make that type of decision, they were responding to the question stem and not to the part about achieving outcomes.

Question 56 – Need to clarify whether this means a deliberate strategy or simply because as a principal you are aware of them and their needs.

Question 61 – Long sentence, may need to shorten.

4.2.3 Missing Issues

Following the analysis of items included in the questionnaire, pilot principals were asked whether there were any critical issues related to decision-making that they felt had been omitted in the questionnaire.

The following points were raised by respondents:

- Four respondents indicated that a specific question related to resource and finance policies should be included as there is a proliferation of regulations and audit requirements that negatively impact on the running of schools.
- Similarly staffing matters were raised by four principals as an area that warranted a separate question as there was greater likelihood of schools taking a risk in their decision-making related to these matters than those that related directly to students.
- How principals are concerned about the possibility of being sued on a personal basis due to non-compliance.
- There needs to be some opportunity for schools to be autonomous in their decision-making.
- Principals need to know what the rules are and with the regulatory framework there are too many things to remember.
- Guidelines are good, but policy can cause problems for schools.
- Socio-economic index of school community should be included in demographic information.
- Education support or disability flavour could be added to some questions.

Finally the pilot principals were asked whether there were any factors that promote risk-taking in their decision-making that they felt were not adequately covered in the questionnaire.

Respondents indicated that principals are not willing to test boundaries and take risks due to constraints imposed by the central office of the Department of Education and Training. A view was expressed that these constraints deterred principals from making autonomous decisions that were most appropriate to the local needs of their school and community. One principal noted that “you do things because you’ll get into strife if you don’t”. However, in contrast another respondent indicated that the potential for disciplinary action by the Department was not considered to be a significant risk.

Taking a risk in decision-making was articulated by one respondent as simply “am I prepared to wear this” in reference to potential consequences. There was a consensus that you decide if the rules are reasonable in the circumstances and that risk-taking is justified when you make a “good enough decision”, that is informed and can be defended in the circumstances, and “it leads to a better outcome”. However, it was noted as a concern that some district directors, who are the line managers of principals, “don’t care about outcomes as long as you follow the rules”.

Several principals indicated that risk taking required the rationale for a decision to be documented. This would enable justification of the decision-making process if queried at a later time. Principals were prepared to defend their decision-making processes as they saw themselves as taking risks for sound reasons and to achieve better outcomes. However one respondent indicated that “many would be panic struck if called to account”. These principals would want to be clearly distinct from “people who break rules for no good reason”.

It was also noted that the “regulatory framework is outmoded in some areas” creating pressure to be non-compliant. One principal highlighted the need to be conscious of legislative frameworks such as that for disabilities and to ensure that decisions fall within these.

4.2.4 Amendments to questionnaire

A copy of the final version of the questionnaire can be found at Appendix 4. Below is a summary of changes made to the pilot questionnaire as a consequence of feedback from the piloted principals. Question numbers below refer to the pilot questionnaire for ease of reference to the feedback provided above. Final question numbering for each amended item is indicated in brackets where this differs from the pilot questionnaire.

- Questionnaire ID, to allow identification of pilot respondent for contact regarding feedback, removed.

- Introductory pre-amble inserted to outline the purpose of the questionnaire and provide some examples of regulatory framework policies that may have required principals to consider risk taking in their decision-making.
- The word “main” was inserted before purpose in questions 19 and 24 to clarify the distinction between the purposes of the regulatory framework as compliance or educative.
- In question 24 the words “not compliance but” were also included to further clarify this distinction.
- Question 25 was reworded to take account of principal feedback with regard to being leading.
- “Even if I were not required to use them” was added to the beginning of Question 26 to reduce the emphasis on the control mechanism of the regulatory framework.
- The wording of question 30 was amended to clarify the meaning of the question.
- The wording of question 38 was amended to clarify the meaning of the question.
- An additional item (question 47) was included in response to feedback regarding principals’ concern about the possibility of being sued on a personal basis due to non-compliance.
- Question 47 (question 48) was amended to clarify the perspective.
- The word “consciously” was included in the stem of question 49 (question 50) so that it referred to a deliberate action.
- “Even if I were not required to do so, I would” was added to the beginning of question 50 (question 51) to reduce the emphasis on the control mechanism of the regulatory framework.
- An additional item was included (question 54) in response to feedback that the regulatory framework constrained principals from making decisions that were the most appropriate for the local needs of their school and community.
- Question 57 (question 59) was amended to clarify that the risk in decision-making was taken to “meet the outcomes required” as principals indicated that this was their primary rationale in taking such risks.
- An additional item was included (question 64) regarding regulatory framework policies related to maintenance, finance and purchasing.

- An additional item was included (question 65) regarding regulatory framework policies related to relief staffing, performance management and substandard performance of staff.

4.2.5 Finalised Questionnaire

The refined version of the survey questionnaire was then used to collect data to test the hypotheses depicted in the research model. The survey was sent to principals in a stratified random sample of 253 schools across the state from a population of 771 Western Australian government schools. The sample was selected to be representative across government school districts, geographical location, school type and school size at a 99.5% confidence level. The calculated sampling error rate for this sample size is 8.53%. The confidence level and sampling error rate for the number of respondents who returned the questionnaire in each of the strata is provided in Table 4.1. The maximum number of items used to measure a construct within the research model was also considered in determining the sample size.

Early childhood education centres and junior primary schools have been included in the primary school strata as there were insufficient to include these as separate strata. Senior colleges are shown separately in Table 4.1, but these have been included under the secondary strata for the purpose of the analysis. High schools have also been included in the secondary school strata. Schools in this strata operating under a middle schooling paradigm have not been separately identified as this information is not recorded in the Department's School Profile System from where the population data was obtained.

Remote community schools, the school of distance education and education support centres are inclusive of students from K-12 and enrolments in each level varies significantly by school. These categories of schools have been included in the sampling frame, but have not been included within the strata analysis by school type.

The strata are shown below to provide an indication of how many of each type of school were included in the sample and participated in the study. Analyses and reporting have incorporated strata where there are small numbers of schools of any type to ensure anonymity of the respondents. The confidence level and associated error rate based on the sample size in relation to the population have been calculated for each of the strata.

Geographical location is broken down into remote, rural and regional centres and metropolitan in the questionnaire. The strata categories of rural and regional centres are grouped as country in Table 4.1 as this is how the data is recorded in the Department's School Profile System from where the population data was obtained.

Table 4.1: Numbers of principals in sample by strata of geographical location and school type

Geographical Location	Metro	Country	Remote	Total Respondents
Sample Size	93	132	28	253
Population	426	312	33	771
Confidence Level	95%	95%	95%	95%
Error Rate	8.98%	6.48%	7.21%	5.05%

School Type	Primary	District High	Secondary	Senior College	Agricultural College
Sample Size	115	40	56	7	5
Population	510	59	85	8	5
Confidence Level	95%	95%	95%	95%	95%
Error Rate	8.04%	8.79%	7.65%	13.1%	0%

4.3 ADMINISTRATION OF QUESTIONNAIRE

The survey was administered in the second semester of 2006. An email reminder was sent to principals in October 2006 and this was followed up by a second reminder in November 2006. A total of 140 principals returned the questionnaire by the end of the 2006 school year. This is a response rate of 55% (out of 253).

An analysis of descriptive statistics was undertaken in SPSS. The tables of results in the following section show the breakdown of responses received across the strata of geographical location and school type as identified by principals on the returned questionnaires. Review of this data provided assurance that there was no bias evident across the sub-groups for principals who did not participate and those principals who returned their survey forms. Hence no non-response bias test was undertaken.

The sub-groups used for the analysis were remote, country and metropolitan for the strata of geographical location; and primary, district high and secondary for the strata of school type. The categories were combined within the strata to ensure that there were sufficient responses received within each sub-group to assure statistical confidence in the results for each sub-group.

4.3.1 Descriptive Statistics

This study has focused on principals and acting principals in government schools across Western Australia. Responses were received from 121 principals and 19 acting principals. In addition to geographical location, school type and size, demographic characteristics of the sample included gender and age of principal, highest level of education achieved, length of employment as a principal and in the teaching profession, and whether the principal was substantively appointed to their position. Whilst no quotas were applied beyond geographical location, school type and size, the random nature of selection of the schools was assumed to provide a representative sample across the overall population of principals for these demographics.

Under half of the respondents (40%) were female and 60% were male. The age of 52% of respondents was 51 years or over. Ninety percent had over 10 years experience as a teacher or school administrator and 60% had been employed in the role of school principal for more than 5 years. Fifty percent of principals responding had achieved tertiary qualifications above Bachelor level. All of the education districts across Western Australia were represented in the responses and a representative coverage of school locations and types was provided in the respondents. Tables 4.2 and 4.3 show the number and percentage of responses from each school location and school type.

Table 4.2: Percentage of responses by Location

Location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Remote	15	10.7	10.8	10.8
	Rural	52	37.1	37.4	48.2
	Regional Centre	18	12.9	12.9	61.2
	Metro	54	38.6	38.8	100.0
	Total	139	99.3	100.0	
Missing	System	1	.7		
Total		140	100.0		

Table 4.3: Percentage of responses by School Type

SchoolType

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	69	49.3	49.6	49.6
	District High	23	16.4	16.5	66.2
	Secondary	37	26.4	26.6	92.8
	Agricultural College	5	3.6	3.6	96.4
	Senior College	5	3.6	3.6	100.0
	Total	139	99.3	100.0	
Missing	System	1	.7		
Total		140	100.0		

The descriptive statistics related to the variables school size, proportion of Indigenous students and proportion of ESL students are shown in Table 4.4. For each of these

variables there was a large difference between the mean and the median, indicating that the values are not normally distributed. The majority of cases were clustered at the low end of the scale, with most falling below 500 in school size, and below 5% for Indigenous and ESL students. There are, however, a few cases of school size over 2000 and of proportion of Indigenous and ESL students of 100%. These high values for only a small number of cases have a significant effect on the mean but little or no effect on the median, making the median a better indicator of central tendency for these three variables.

Table 4.4: Descriptive statistics for key demographic variables

Statistics

		SchoolSize	Proportion of Indigenous students	Proportion of ESL students
N	Valid	140	136	123
	Missing	0	4	17
Mean		436.61	17.953	20.024
Median		332.00	4.750	7.000
Std. Deviation		428.327	29.3613	28.7300
Minimum		10	.0	.0
Maximum		3390	100.0	100.0

4.3.2 Additional Qualitative Feedback

One school made phone contact with the researcher to indicate that the principal would not be participating in the study as she was on extended leave. Another principal made email contact with the researcher indicating that the questions included in the survey made him feel uncomfortable and apologising that he therefore felt unable to complete and return the survey. After email correspondence with the researcher this respondent made a decision to complete and return the questionnaire.

The stakes of taking risks in decision-making for school principals can potentially be high. A very highly publicised example of risk-taking in decision-making by a Western Australian Department of Education and Training principal was reported in *The West Australian* newspaper on 14 October 2006. The principal of a remote school was allegedly dismissed by the Minister of Education as a consequence of a controversial

decision that was taken to try to resolve the serious truancy problems being experienced at the school. Evidence available on the outcomes of the decision indicate that it was successful in achieving the increase in attendance it was attempting to achieve, with school attendance being boosted from 54% to 80% in the two months the school operated the principal's initiative. However, the decision took account of the unique circumstances of the families in the community to achieve this end, and in doing so was seen to be potentially discriminatory.

One respondent principal sent an accompanying letter with their completed questionnaire indicating that they felt "very strongly about the principal who was victimized for showing initiative in solving his school's attendance problems".

4.4 RASCH ANALYSIS

Rasch analysis (Rasch, 1960/1980; Lunz & Linacre, 1998; Andrich, 1988 & 1989) was the methodology used to examine the psychometric properties of the questionnaire data. The procedure involves scaling the results of principals on each item in the questionnaire relative to their responses on the other items. The procedure for analysing differential performance uses the principles of latent trait theory. The model requires that there is a single latent trait which governs the responses of all persons to all items. In this study this trait would be reasoned risk-taking in decision-making. This component of the analysis aimed to produce a measurement scale of the attitudes and behaviours of school principals towards risk-taking in decision-making.

The use of Rasch analysis has several strengths in relation to traditional statistical techniques. Application of the Rasch measurement model requires that variables be measured in common units and also that persons and items are positioned on the same interval scale. In addition, the calibration process for Rasch analysis ensures that the scales developed are linear. "Testing the psychometric properties of data from a scale using classical techniques will not reveal errors due to item disordering" (Cavanagh & Romanosky in Waugh, 2005, p.68). Cavanagh and Romanosky (Waugh, 2005, p.68) and Cavanagh and Waugh (2004) indicate that measurement errors due to disordered Likert scale responses are undetected by traditional techniques, whereas

items where respondents have not answered consistently or logically can be detected using Rasch and omitted from further analyses. Use of the measurement stage of structured equation modeling (SEM) analyses provides tests of the reliability of the items in the model and information about their functioning. However, Cavanagh and Romanoski (Waugh, 2005, p.68) point out that SEM will not reveal errors due to item disordering or test whether the respondents have answered survey items consistently and logically. Rasch psychometric scale analysis provides insight into these additional sources of measurement error.

The questionnaire developed for this study was analysed by using RUMM 2020 (Andrich, Sheridan & Luo, 2005) to validate the data on the items in the questionnaire and persons responding to it and to develop an interval scale comprised of items that were determined to fit the model. The algorithm in the program (Andrich, Sheridan & Lyne, 1991) uses a pairwise procedure, and providing there is no overlap in the response patterns, it handles missing data routinely. Therefore it was able to handle the items to which a principal did not respond.

4.4.1 The Rasch latent trait model

The model for polychotomous ordered responses used is based on the model developed by Rasch (1960/1980) for dichotomous items, in which the probability that a person responds correctly to the item is a monotonic function of two parameters, an item parameter and a person parameter. In measurement of attitudes, the item parameter, δ_i, for item i is termed the difficulty of the item and the person parameter, β_j, is termed the attitude of person j. The requirements of the model, stated by Andrich (1989), are that only the two parameters are available. The total score for each person by summing their responses to each item provides a sufficient statistic for estimating the item difficulties (Andrich, 1988).

The model for ordered response categories, a generalisation of the dichotomous model, takes the form: $P \{ X=x; \beta_j; \delta_i; \tau_k \} = \exp \{ x (\beta_j - \delta_i) - \Sigma \tau_{ki} \} / \gamma_{ji}$

where $x \epsilon \{ 0, 1, 2, 3 \}$ and $\gamma_{ji} = 1 + \Sigma \{ \exp k (\beta_j - \delta_i) - \Sigma \tau_{ki} \}$

where β_j is the location of the attitude of the person j, δ_i, is the difficulty of the item i, τ_{ki} is the threshold or cut-off point between the categories, and X is a random variable, in this case principals' response on an item in the questionnaire. The estimates of item difficulty and person attitude obtained using this model are measures that are expressed in equal interval units.

For items on the questionnaire to form a unidimensional measurement scale persons should achieve a higher score on items that have a difficulty scale value below their attitude to *reasoned risk-taking in decision-making* and lower scores on items that have a difficulty scale value above their attitude measure. The more positive the attitude of the person the more likely that person should be to gain a higher score on the item. In practice, the response pattern of any individual will differ from the expected response pattern on some items; however, the overall response pattern should fit the model for reliable measurement to take place. For an item to fit the Rasch model, persons with positive attitudes to *reasoned risk-taking in decision-making* should have a higher probability of gaining a high score on an item than persons with a negative attitude. For a person to fit, they should have a higher probability of getting a high score on easy to endorse items than on harder to endorse items. The advantage of the Rasch model is that if the items fit the model, then their properties are invariant across different attitudes of persons. Therefore the model is sensitive to any violations of this invariance.

4.4.2 Results of the Rasch Analysis

The RUMM program abandoned the first run of the analysis as item 10, School Size, was found to be extreme. In personal communication, Sheridan (13 August, 2007) indicated that this occurs when: "all persons answer either the extreme low or extreme high category. It therefore offers no contrasts and consequently no information for providing estimation. This item is poorly targeted so that is the area in which to seek a solution by reassessing the composition, or range, of your calibration sample." Given that schools contained differing numbers of students this was not directly applicable to this item. It is likely that the difficulty occurs as some of the categories for this item are "null" (Andrich, Sheridan & Luo, 2005, p.44) in that they have a zero frequency of

response. In this case, Andrich, Sheridan and Luo indicate that 'the estimation of thresholds defining this category in the Rasch model is problematic". It is possible to collapse categories, however, Andrich, Sheridan & Luo (2005, p.45) advise that there are theoretical reasons against this approach in the Rasch model. A decision was therefore made to remove the item as it collected demographic data and was not an item of the questionnaire reliant on use of a Likert scale for measurement. On removing the item from the data set the RUMM program was able to run through and complete its estimation routines.

In this analysis centralised item thresholds were calculated. The RUMM analysis also produces uncentralised thresholds which provide an indicator of item difficulty. For the purpose of refining the measurement items the centralised thresholds were scrutinised for items with disordered thresholds. The item thresholds are shown in Table 4.5. These thresholds were Identified items were discarded from further analysis as the existence of disordered thresholds indicates that the items were not operating logically or consistently in regard to responses provided on the Likert scale. Disordered thresholds were found for items 8 Location; 9 School Type; 11 and 12 the proportions of Indigenous and ESL students. These items were retained as they were open response quantitative items and were not based on a Likert scale. However, questions 13, 25, 29, 33, 38, 43, 56, 57, 59, 60, and 61 were discarded on the basis of disordered thresholds as they were not operating as expected. Data from the items with ordered thresholds were retained for further analysis.

Table 4.5: Centralised Thresholds

Question	Location	CenThr 1	CenThr 2	CenThr 3	CenThr 4	CenThr 5	CenThr 6
Location	-0.13984	-0.77	1.441	-0.671			
School Type	1.00623	0.376	-1.158	1.456	-0.673		
Indigenous	0.251236	0.774	0.273	-0.262	-0.651	-0.715	-0.273
ESL	0.220794	0.727	-0.066	-0.345	-0.294	-0.096	0.066
13	-3.90127	0.207	-2.828	2.621			
14	0.282702	-2.089	0.465	1.624			
15	-0.57375	-1.309	-0.752	2.061			
16	0.268026	-2.48	0.16	2.32			
17	-0.27838	-2.152	-0.54	2.692			
18	-0.72241	-1.672	-0.546	2.218			

19	-1.02836	-1.753	0.226	1.527
20	-1.96758	-3.933	1.151	2.781
21	-2.00502	-2.507	-0.199	2.706
22	-0.5849	-3.513	0.891	2.622
23	-2.00582	-3.793	1.194	2.599
24	0.02609	-1.231	-0.138	1.368
25	-0.83349	-0.8	-1.511	2.311
26	-1.73115	-4.342	0.529	3.813
27	-1.01804	-1.454	-0.215	1.669
28	-0.31088	-1.365	-0.392	1.757
29	1.075536	-0.612	0.505	0.107
30	-0.16479	-2.309	0.45	1.858
31	-0.62698	-1.893	-0.103	1.997
32	-0.1273	-1.904	-0.876	2.779
33	-0.63968	-0.442	-1.412	1.853
34	-1.96805	-4.851	2.318	2.533
35	0.083649	-1.604	-0.994	2.599
36	1.101064	-2.157	-0.579	2.737
37	-0.62627	-2.37	-0.342	2.712
38	-0.02066	-1.992	1.251	0.741
39	0.207149	-1.964	0.177	1.788
40	-0.22025	-1.531	-0.583	2.115
41	0.471836	-2.147	-0.336	2.483
42	1.17015	-2.467	0.785	1.682
43	-0.32486	-0.728	-1.008	1.736
44	-0.46365	-1.698	-0.497	2.195
45	-0.3569	-3.491	1.15	2.341
46	-0.35659	-3.702	0.341	3.361
47	-0.85565	-2.782	0.622	2.159
48	-0.68758	-2.343	0.642	1.701
49	0.547331	-2.042	0.012	2.029
50	-0.71556	-1.462	-0.128	1.59
51	-0.6908	-3.019	0.718	2.301
52	-0.68558	-2.814	0.525	2.289
53	-1.92285	-3.682	0.231	3.451
54	1.33411	-2.845	0.72	2.125
55	0.53637	-0.921	0.032	0.888
56	4.523194	-3.154	2.9	0.254
57	1.947693	0.355	4.709	-5.064
58	0.239727	-1.979	0.123	1.855
59	0.853383	-0.999	0.528	0.471
60	1.787935	-1.05	0.96	0.09
61	1.143501	-1.356	0.77	0.587
62	1.78908	-2.142	0.586	1.556
63	1.788379	-1.863	0.354	1.509
64	2.991461	-2.433	0.235	2.197
65	2.908249	-2.511	-0.12	2.631

Response category curves showed inconsistent use of response categories for a number of items. Closer scrutiny of the category response frequencies for items 13, 25, 33, 56, 57 and 60 showed that these items were poorly targeted for this group of respondents. All respondents either agreed or strongly agreed to items 13 and 56. Very few respondents disagreed with items 25, 33 or 57 and few agreed with item 60. As a consequence these items failed to adequately discriminate between respondents.

The retained items were subsequently examined for high residuals and Chi Square probability. The residual for an item is the difference between the actual response and the expected response to the item as predicted by the measurement model. A low residual of <±2.0 indicates that the item fits the model, whereas a high residual shows poor fit to the model. The Chi Square estimates the probability that the item's data fit the model whereas a probability value with $p<0.05$ shows poor fit to the model. Item 12 had a high residual and a high Chi Square with a probability of zero and was therefore discarded from further analysis. The results of this analysis are presented in Table 4.6. The individual item-fit statistics also show that the majority of items, both attitudinal and behavioural, fit the model.

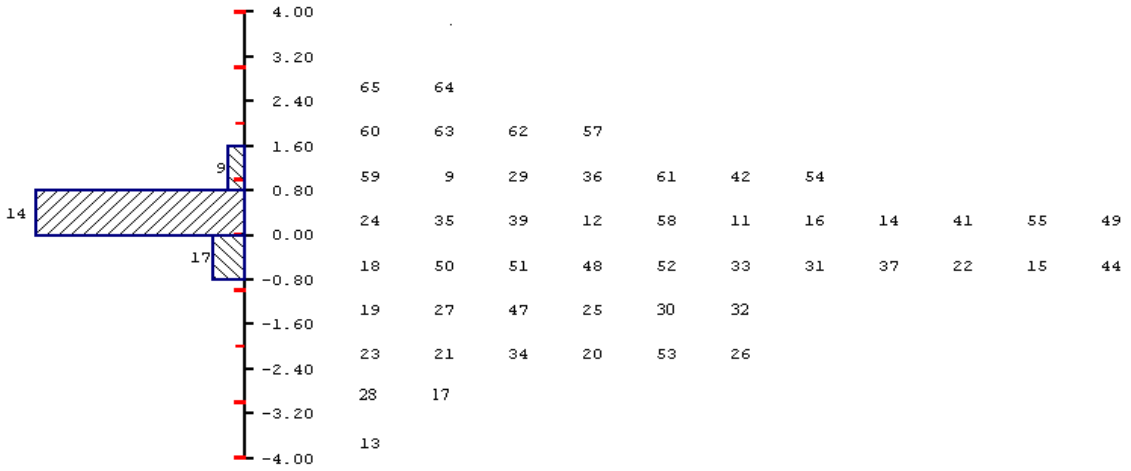
Table 4.6: Individual Item Fit

Item	Location	SE	FitResid	DF	ChiSq	DF	Prob
8	-0.14	0.081	1.081	133.36	2.925	2	0.231623
9	1.006	0.079	0.483	133.36	0.256	2	0.879644
11	0.251	0.042	1.57	130.48	12.173	2	0.002274
12	0.221	0.043	2.786	118.01	29.971	2	0
13	-3.901	0.225	0.233	134.32	0.369	2	0.831437
14	0.283	0.12	-0.193	131.44	9.962	2	0.006867
15	-0.574	0.137	0.294	131.44	0.216	2	0.897691
16	0.268	0.133	0.226	131.44	0.861	2	0.650121
17	-0.278	0.148	0.361	130.48	0.469	2	0.790941
18	-0.722	0.142	0.374	128.56	0.649	2	0.722771
19	-1.028	0.119	0.272	134.32	1.291	2	0.524335
20	-1.968	0.126	0.512	133.36	2.182	2	0.33594
21	-2.005	0.151	0.099	133.36	0.396	2	0.820399
22	-0.585	0.133	-0.304	133.36	2.176	2	0.33689
23	-2.006	0.125	0.375	131.44	1.224	2	0.542164
24	0.026	0.107	0.841	128.56	1.802	2	0.406246
25	-0.833	0.159	0.143	133.36	2.202	2	0.332605
26	-1.731	0.163	0.435	128.56	1.128	2	0.568813
27	-1.018	0.128	-0.17	131.44	2.63	2	0.268436

28	-0.311	0.122	0.32	127.6	0.931	2	0.627787
29	1.076	0.103	0.728	131.44	12.744	2	0.00171
30	-0.165	0.124	-0.149	125.68	4.312	2	0.115817
31	-0.627	0.128	-0.147	128.56	4.677	2	0.096451
32	-0.127	0.155	0.247	126.64	4.634	2	0.098558
33	-0.64	0.142	0.095	129.52	0.06	2	0.970619
34	-1.968	0.109	-0.757	132.4	5.459	2	0.065263
35	0.084	0.141	0.499	131.44	1.785	2	0.409594
36	1.101	0.124	0.425	133.36	2.371	2	0.30565
37	-0.626	0.149	0.346	130.48	0.653	2	0.721283
38	-0.021	0.106	-0.317	130.48	2.642	2	0.266898
39	0.207	0.119	0.228	131.44	6.316	2	0.042511
40	-0.22	0.13	0.645	132.4	0.918	2	0.632007
41	0.472	0.129	-0.019	133.36	3.671	2	0.159498
42	1.17	0.15	-0.017	130.48	10.434	2	0.005423
43	-0.325	0.125	-0.071	130.48	9.026	2	0.010964
44	-0.464	0.134	0.088	133.36	8.746	2	0.012611
45	-0.357	0.138	0.972	126.64	11.043	2	0.004002
46	-0.357	0.151	-0.251	132.4	9.795	2	0.007466
47	-0.856	0.127	0.467	121.84	2.377	2	0.304619
48	-0.688	0.115	0.101	130.48	2.093	2	0.351213
49	0.547	0.123	0.552	133.36	1.486	2	0.47578
50	-0.716	0.119	0.565	134.32	2.539	2	0.280934
51	-0.691	0.124	0.947	134.32	7.935	2	0.018918
52	-0.686	0.126	0.434	133.36	1.06	2	0.588565
53	-1.923	0.157	0.245	134.32	1.956	2	0.376038
54	1.334	0.168	-0.176	122.8	6.878	2	0.032105
55	0.536	0.099	-0.175	122.8	0.362	2	0.834242
56	4.523	0.203	0.176	120.88	0.933	2	0.627103
57	1.948	0.206	0.177	121.84	2.854	2	0.240085
58	0.24	0.123	0.376	126.64	2.039	2	0.360788
59	0.853	0.104	-0.404	126.64	5.766	2	0.055966
60	1.788	0.142	-0.279	130.48	8.902	2	0.01167
61	1.144	0.119	0.176	129.52	1.965	2	0.374382
62	1.789	0.144	-0.034	130.48	7.345	2	0.025416
63	1.788	0.137	-0.3	128.56	6.844	2	0.032644
64	2.991	0.163	-0.123	122.8	1.604	2	0.448521
65	2.908	0.156	-0.307	121.84	7.104	2	0.028668

The questionnaires formed a fair measure of the trait *reasoned risk-taking in decision-making* for this group of principals. The difficulty level estimates of the items ranged from –3.901 to 4.523, whereas the attitude level estimates for the principals ranged from –2.71 to 1.201. For most accurate measurement of persons on a trait, item difficulty should be matched as closely as possible to the person's attitude levels as the standard errors of measurement are least in this case. All of the items with difficulty levels above 1.201 referred to behaviours. Andrich and Styles (1994) have found that

behavioural items tend to be more difficult to agree to than attitudinal items. In their paper they argue that attitude and behaviour statements fall on the same measurement continuum with behaviour statements at the higher end as they are harder items to agree to. Thirteen of the 17 behavioural items on the questionnaire had difficulty locations above zero, the mean of the measurement scale. Figure 4.1 shows the distribution of the attitudinal and behavioural items, which were analysed together, and also the location of principals on the measurement scale.



Persons **Item Locations**

Figure 4.1: Item Map showing the person/item distribution with the items identified

The variance among attitude estimates relative to the error variance for each person was acceptable. The separation index, an index similar in principle to the traditional reliability index (Andrich, 1982) can be calculated as the ratio of the estimated true variance of ability relative to the observed variance. The value in this case was 0.633 which indicates the power for test-of-fit is “reasonable”. Analogous to the traditional reliability index, the greater the variation in person attitudes the greater the opportunity for the ordering of persons to reveal itself. As the variation in persons’ attitudes becomes extreme the separation index tends to one and as variation in persons tends to zero the index of separation also tends to zero. A separation index close to zero would indicate that the differences among the attitude estimates of principals were no

greater than would be expected by chance relative to the error of measurement. Re-analysis of the data with items with disordered thresholds and the item with misfitting statistics removed, did not improve fit with the model. The separation index was low at 0.599 and the power for test-of-fit "reasonable". Andrich, Sheridan and Luo (2005, p.35) asserts that this is a common problem when discarding items as precision of measurement is reduced when items are eliminated.

In order to check for any differential performance due to gender, age, level of education, substantive appointment as principal or school location, the responses to each item were divided into categories in each case, thus creating multiple items, one for each response for each item. For example, for level of education there would be four items corresponding to each of the education levels identified in the questionnaire; bachelor, post graduate diploma, Masters and Doctorate. The frame of reference for checking any bias for subscales for each construct and for individual items is the overall estimate of a single latent trait, reasoned risk-taking in decision-making, for each person, based on a score from items from all subscales. If there is no bias in an item relative to this frame of reference, then the expected value curve for each group, such as principals from each school type, will be equivalent. Otherwise, for chosen values of the latent trait, the expected values will be different.

Item characteristic curves, which are expected value curves, show how the items discriminate. These were therefore drawn for each item for each gender, age, level of education, substantive appointment as principal or school location, to determine whether bias was evident. A statistical test was then conducted to determine if any difference observed in the item characteristic curves was significant. Ironson (1983, p.155) indicates that the use of item response theory provides two advantages over traditional methods when attempting to measure item bias. Firstly, it provides a common scale of reference for person ability for each group and for item difficulty which avoids having to make judgements of bias relative to a separate criterion which itself may or may not also have inherent bias. In the context of this analysis, an assumption is made that the bias in the questionnaire as a whole is less than that present in individual items. Secondly, it circumvents problems associated with different

distributions in opinion in the two groups of interest as the item response theory models are designed to be insensitive to the different shapes of the distributions.

The differential item functioning analysis found no bias in any item of the questionnaire in relation to gender, age, level of education or school location. Item 49 was found to show bias in relation to substantive appointment as principal. This item asked whether principals referred to training or professional development in their decision-making. Non-substantive principals were significantly more likely to agree that they refer to training or professional development in making decisions. Item 27 was found to show bias in relation to both time employed as a principal and to time employed as a teacher/school administrator. This item asked if the respondent had a great deal of experience in making decisions as a principal. Those principals with less time in the job were more likely to indicate that they had less experience in decision-making. In both cases where differential item functioning was found, the correlation between the demographic factor and the item was intuitively obvious and there was deemed no need to scrutinise the items for any further explanation.

A further Rasch analysis was conducted looking at the subscales determined by each of the constructs in the hypothesised model. The five aspects were: compliance governance mechanism; educative governance mechanism; experience of principals; stakeholder characteristics; and reasoned risk-taking in decision-making. The first construct, compliance mechanism, is measured by 15 items on the questionnaire. The second, educative mechanism, is measured by 5 items. The third, experience, which is proposed to be a mediating variable in the model, is measured by 16 items. The fourth, stakeholder characteristics, is measured by 13 items. Finally, the dependent variable of reasoned risk-taking in decision-making is measured by 14 items in the questionnaire. Each of these constructs was analysed to determine whether the items included on the questionnaire for each of the constructs formed a scale of measurement for the construct. In RUMM this is achieved through running the creating subtests procedure. This procedure employs a technique similar to that used for deleting items, but “the original items are now regrouped rather than being deleted completely from the analysis” (Andrich, Sheridan & Luo, 2005, *Extending the RUMM2020 Analysis Manual,* p.63*)*.

This analysis showed poor fit to the model with a separation index of only 0.34. This outcome could be due to non-linearity of the constructs. It is consistent with the grouped items operating in a non-linear way due to the constructs providing multiple traits for measurement. The low Chi Square (p=0.0000) for the item-trait interaction of the questionnaire as a whole also supports the inference that the scale was not measuring a unidimensional trait but was more likely measuring a dominant trait comprised of several dimensions. This is a limitation arising from the analysis and further poor fitting items would need to be deleted to create a unidimensional scale. Rasch item-trait interaction is considered a better method than factor analysis for determining unidimensionality (Smith, 1996; Waugh, 1996; Waugh & Chapman, 2005). However, factor analysis is considered a useful tool for data reduction when multivariate techniques are to be used sequentially (Hair et al., 2006). An exploratory factor analysis was conducted as the next phase of analysis to test this possibility and to confirm the grouping of items within the constructs identified in the hypothesised model.

The rigorous statistical procedures employed in the data analysis for this study resulted in data for 12 items in the questionnaire, identified in Table 4.7, being discarded from analysis using structural equation modeling. However, the data retained complied with the stringent measurement criteria applied providing confidence in the constructs measured by these data in the hypothesised model. Cavanagh and Romanoski (Waugh, 2005, p.77) indicate that reduction of measurement items through the use of statistical and conceptual procedures during an empirical investigation is acceptable and improves the measurement properties of the survey instrument. They discuss a study of school classroom learning culture where two thirds of the items from their original survey were discarded following Rasch analysis leaving a scale of logical elements for the constructs of interest. Cavanagh and Romanoski then used structural equation modeling to examine the interaction between the elements of the statistically validated structural model.

Table 4.7: Items deleted through Rasch analysis

Reason for deletion	Items deleted
Extreme item	10
Disordered thresholds	13, 25, 29, 33, 38, 43, 56, 57, 59, 60 & 61
Total	Twelve items deleted

4.5 EXPLORATORY FACTOR ANALYSIS

An exploratory factor analysis was conducted using SPSS Version 12 for the items comprising each of the constructs in the hypothesised model. The factor analysis was undertaken to assist in further data reduction, following removal of misfitting and illogical items through Rasch analysis. Hair et al. (2006, p.110) indicate that data reduction through factor analysis "is an excellent starting point for many other multivariate techniques" and can substantially reduce problems associated with large numbers of variables in the subsequent analyses. This section describes the analysis conducted and the results.

The aim of the factor analysis was to determine whether the items in the questionnaire were loading onto the constructs they were developed to measure and subsequently to remove highly correlated items by replacing them with a smaller number of uncorrelated items for each construct. Hair et al. (2006, p.109) posits that data reduction can simplify subsequent multivariate techniques by identifying the most parsimonious set of variables to include in the analysis that adequately represent the original set of variables. This was an important consideration in this study as the presence of a moderating construct in the hypothesised model creates a difficulty in structural equation modeling as the number of items in the SEM analysis needs to be minimised for each construct. As structural equation modeling is the ultimate analytic technique to be used in this study, identification of the most valid and reliable items that measure each construct was a necessary preliminary to running the SEM component to analyse the hypothesised model due to the presence of moderating variables.

Exploratory factor analysis was conducted as this approach is deemed appropriate when seeking to determine the number of underlying factors that need to be retained to reproduce the observed correlation matrix (Heck, 1998, pp.178-179). Heck indicates that exploratory factor analysis is particularly useful, and preferable to confirmatory analysis, when the researcher believes there is an underlying set of theoretical relationships but is not sure whether these underlying factors are well measured by the items. In this study the literature and preliminary qualitative data collection has provided a strong case for the theoretical constructs in the hypothesised model. However, each of the items included in the questionnaire to measure these constructs has been developed specifically for this study. There is therefore no existing validation of their measurement performance.

Before commencing the factor analysis a correlation matrix of all items in the questionnaire was calculated to confirm the appropriateness of the approach. Coakes and Steed (2007, p.123) and Hair et al. (2006, p.114) indicate that sizable correlations, in excess of 0.3, are required to be present in the correlation matrix to justify use of factor analysis techniques. There were 147 correlations found that met this criteria and hence it was deemed appropriate to continue to conduct the factor analysis.

The principal components method of extraction was used to find linear combinations of items that account for as much variation across responses as possible. Component factor analysis is most appropriate for data reduction as it considers the total variance represented in the original set of variables to derive the minimum number of factors needed for prediction purposes (Hair et al., 2006, pp.116-118). The SPSS program calculates communalities that indicate the amount of variance in each item that is accounted for by the identified components or factors for that construct. A high communality indicates that an item has a large component in common with other items for the construct and may therefore be a useful item to retain as an indicator of the construct in the final SEM analysis as it represents the construct well. In summary the communalities for each construct were:

Construct 1: Compliance governance mechanism; 10 of the 15 communalities were greater than 0.5.

Construct 2: Educative governance mechanism; All 5 of the 5 communalities were greater than 0.5.

Construct 3: Experience; All 16 of the 16 communalities were greater than 0.5.

Construct 4: Stakeholder characteristics; 12 of the 13 communalities were greater than 0.5.

Construct 5: Risk-taking in decision-making; All 14 of the 14 communalities were greater than 0.5.

The SPSS program calculates eigenvalues which show the amount of variance accounted for by each of the principal components or factors identified in the analysis. Components with initial eigenvalues greater than 1 are retained by the program and used to provide a solution that shows the cumulative percent of variance explained by these components. This solution was then rotated for ease of interpretation. Rotation allows the variation explained by the extracted components to be spread more evenly over the components and assists in interpretation of the results as it shows more clearly what each of the components represents.

It was found that the extracted components with eigenvalues greater than 1 accounted for between 52.3% and 70.9% of the variance in the constructs. In determining how many factors to retain, the potential reduction of data needs to be weighed against the loss of complexity of the original data set. To assist in the decision of how many factors to retain for each construct the scree plots were examined. These are plots of the eigenvalues of each component in the solution and provide a useful visual tool to assist in determining the optimal number of factors to be retained. The items relating to each of the components in the solution were also scrutinised with reference to the literature and outcomes of the preliminary interviews with principals from Section 3.3.1. Hair et al. (2006, p.110) advises that “the researcher should always consider the conceptual underpinnings of the variables and use judgment as to the appropriateness of the variables”.

Consideration of the items for each factor identified aspects of the construct that were consistent with the literature and preliminary findings initially used to develop the questionnaire. A summary of the factors, and an interpretation of their meaning from the literature and the associated items are shown in Table 4.8. In his study Daale (2003, p.306) made a decision to include items in his questionnaire for only one factor per construct. In his methodology the factor analysis was conducted prior to completion of the final measurement instrument and survey. The measurement instrument was therefore designed to measure only one aspect of each construct. In this study, the factor analysis has been conducted following collection of data and it is deemed more appropriate to align the selection of factors to the theoretical basis on which the questionnaire was developed. Components with eigenvalues greater than 1 that were supported by the theoretical literature outlined in Table 3.2 and discussed in Chapter 2 were retained as indicators for each construct. Retained components are shaded in Table 4.8.

Table 4.8: Retained components for each model construct

Construct 1 Compliance Governance Mechanism

Total variance explained 52.3%

Component 1	Q 15, 17, 18, 22, 54	Delegation of authority; perceived control; pressure to align
Component 2	13, 20, 21, 23, 47	Obligation to comply and be accountable
Component 3	14, 16, 19, 22	System control of process; lack of perceived control
Component 4	49, 50	Perceptions of leaders' preferences

Construct 2 Educative Governance Mechanism

Total variance explained 70.9%

Component 1	24, 25, 26	Focus on outcomes
Component 2	51, 52	Provides assistance

Construct 3 Experience

Total variance explained 65.2%

Component 1	4, 5, 6, 27, 29	Substantive appointment and length of time
Component 2	30, 31, 32, 55	Relevance of experience
Component 3	27, 28, 29, 33	Past success
Component 4	56, 57	Past negative experience; risk aversion
Component 5	3, 9	Type of experience
Component 6	53, 55	Past success achieving outcomes

Construct 4 Stakeholder Characteristics

Total variance explained 64.4%

Component 1	11, 12, 39, 40	Geography; cultural composition
Component 2	8, 10, 11, 58	Seek community input as incomplete understanding
Component 3	34, 38, 58	Diversity
Component 4	35, 36, 37	Stakeholder input
Component 5	7	District

Construct 5 Reasoned Risk-taking in Decision-making

Total variance explained 69.8%

Component 1	41, 42, 43, 44, 45, 46, 59, 60, 62, 63, 64, 65	Take responsibility to meet outcomes; flexible
Component 2	43, 44	Necessary to meet needs
Component 3	46, 48, 61	Pressured and compliant
Component 4	41, 42, 46	Focus on process; little incentive to take risks
Component 5	61, 64, 65	Reference after decision made

Finally the items to represent each of the retained factors were selected. The Rotated Component Matrix was used to select items for each of the factors for each construct. Items with loadings less than 0.6 were discarded from further analysis as not contributing sufficiently to the total variance for the construct. This provided a sufficiently rigorous criterion. In the Daale (2003, p.376) study items with minimum loadings of 0.5 were retained for each factor.

As a result of both the Rasch and factor analyses the most representative items with sound measurement properties were retained for the final component of the analysis in this study. The items retained for the final SEM analysis are listed in Table 4.9.

Table 4.9: Retained and deleted items for each construct

	No. of items retained	Items retained	Items deleted	Items in questionnaire
Construct 1: Compliance Governance Mechanism	9	14, 15, 17, 18, 20, 22, 47, 49, 50	13, 16, 19, 21, 23, 54	15
Construct 2: Educative Governance Mechanism	4	24, 26, 51, 52	25	5
Construct 3: Experience	7	4, 5, 27, 28, 30, 31, 32	3, 6, 9, 29, 33, 53, 55, 56, 57	16
Construct 4: Stakeholder characteristics	9	8, 10, 11, 34, 35, 36, 37, 39, 40	7, 12, 38, 58	13
Construct 5: Risk-taking in decision-making	8	42, 44, 46, 48, 62, 63, 64,65	41, 43, 45, 59, 60, 61	14

4.6 SUMMARY

This chapter has provided a detailed description of the processes undertaken to finalise the measurement instrument and create a measurement scale. The conduct of the pilot study and subsequent feedback and adjustments were also described. The chapter then outlined the process of administration of the finalised questionnaires and each stage of the quantitative analysis of the results used to refine the measurement instrument. Results discussed include descriptive statistics conducted in SPSS; Rasch analysis to develop a robust measurement scale; and exploratory factor analysis to confirm constructs included in the model described in the previous chapter.

The survey questionnaire was completed by 140 principals from a stratified random sample of 253 Western Australian government schools. The sample was selected to be representative across school districts, geographical location, school type and school size.

Rasch analysis was undertaken to ensure that the items developed and included in the questionnaire formed a robust and reliable measurement scale of principals' attitudes and behaviours in relation to the latent trait of *reasoned risk-taking in decision-making*.

Eleven items on the questionnaire were found to have disordered thresholds and were discarded from further analysis as misfitting the model. Following an exploratory factor analysis a further 15 items were deleted to provide a parsimonious group of items that loaded highly and were representative of the underlying constructs.

The following chapter details the methodology of Partial Least Squares (PLS) Structural Equation Modeling used to analyse the model and test the associated hypotheses. The results of the analysis and hypothesis testing are also presented.

CHAPTER FIVE

5 TESTS OF HYPOTHESES

5.1 INTRODUCTION

This chapter continues the detailed description of the methodology used in this study. The items from the administered questionnaire that met the requirements of the analysis described in Chapter 4 were retained to form a robust measurement scale. In this chapter the hypotheses associated with the research model (Figure 3.1) are tested using Partial Least Squares (PLS) based Structural Equation Modeling (Chin, 2001). A nested series of models are analysed. Initially, a simplified model without any interactions between constructs within the model is analysed. Subsequently, the model with interaction terms, reflecting the hypothesised moderation effect of experience on governance mechanism is analysed. Finally, a multi-group analysis is undertaken to test this hypothesis in an alternative way. The results of each of these analyses are then presented.

5.2 STRUCTURAL EQUATION MODELING

For this study a theoretical model (see Figure 3.1, Section 3.4) has been developed to provide a basis for hypotheses linking constructs that have been identified from the literature and the preliminary qualitative study. This theoretical model was analysed using structural equation modeling, with multiple observable measures of the constructs in the model collected in the format of a questionnaire completed by principals of government schools in Western Australia.

Barclay, Thompson and Higgins (1995, p.287) and Gefen, Straub and Boudreau (2000) describe a range of analytical approaches to structural equation modeling that have been used in the literature to simultaneously assess the reliability and validity of the measures of constructs and estimate the relationships between them. Structural equation modeling is usually viewed as a confirmatory procedure, but may be used as an exploratory model development approach (Rigdon, 1998, p.260; Garson, 2007).

This study will combine confirmatory and exploratory purposes. Analysis of the measurement properties of the model is exploratory as it may show the model to be deficient. In this case modifications may be required in the structural equation modeling procedure to ensure measurement requirements are met. In the confirmatory phase, hypotheses from the model will be analysed.

Following this, multigroup modeling will be conducted to determine whether the construct *Experience* has a moderating role in the model. This will include analysis by the moderating construct *Experience* as measured by demographic variables identified by reference to the literature and found to be suitable in the prior stages of analysis. In addition, the data will be split into groups selected to reflect this moderating variable, based on agreement or disagreement to two key experience questions determined through the analysis. The hypotheses will then be tested for each of these experience related subgroups to determine whether there is any significant difference across the subgroups. Difference across the subgroups would provide evidence of a moderating role for *Experience*.

5.2.1 Partial Least Squares (PLS)

PLS is a second generation data analysis technique that allows a combined analysis of the measurement and the structural model to be undertaken simultaneously (Barclay, Thompson & Higgins, 1995, p.288; Chin, 1998; Gefen, Straub & Boudreau, 2000 p,5). However, whilst PLS partials out variance via iterative analysis, allowing its categorisation as a structural equation modeling (SEM) technique; unlike other SEM techniques, PLS is not a covariance based technique. Rigdon (1996) indicates that PLS was "designed to maximise prediction rather than fit" and provides "an alternative for situations where theory is weak". It is based on partial-least-squares analysis and is similar to the first generation technique of linear regression in that its statistical objective is explanation of variance in order to reject the null hypothesis of no-effect (Barclay, Thompson & Higgins, 1995, p.288; Gefen, Straub & Boudreau, 2000, pp.8,9). As a consequence, critics advise (Barclay, Thompson & Higgins, 1995, p.302; Gefen, Straub & Boudreau, 2000, p.27) that it is the technique better suited for predictive applications and theory building. Jöreskog and Wold (1982, p.270) indicate that "PLS

is primarily intended for causal-predictive analysis in situations of high complexity but low theoretical information". This description clearly fits the case of risk-taking in decision-making for public school principals.

The model proposed in this study has limited support from theory in the literature and is in large part based on the results of a qualitative study of principals. For this reason, the PLS technique is better suited to this study than covariance techniques that provide confirmatory analysis of models well grounded in theory. The model will be used to test five hypotheses in a predictive sense. The model developed for this study includes the variable *experience* which is hypothesised to have a moderating effect on the relationship between each of the variables *governance mechanism* and *educative mechanism* and the endogenous variable *reasoned risk-taking in decision-making*. Gefen, Straub and Boudreau (2000, p.38) indicate that the PLS technique has the capability to examine interaction effects with numerous variable levels. This provides a further rationale for the selection of PLS as the technique for analysis in this study.

The statistical assumptions underlying the PLS model and the nature of the fit statistics it produces are also different from a covariance based SEM analysis. Instead of explaining the covariation in the indicators, PLS provides parameter estimates based on minimisation of the residual variance for the dependent variables (Chin, 1998, p.301). PLS provides statistical estimates of item loadings and residual variance for the measurement model, and path coefficients and correlations for the latent variables and explained variance R^2 and average variance extracted for each of the latent constructs (Gefen, Straub & Boudreau, 2000, p.36). Multivariate normality is not a requirement (Barclay, Thompson & Higgins, 1995, p.290).

5.2.2 Model constructs as variables in PLS

The constructs in the proposed model are modeled as variables in PLS. The model (shown in Figure 3.1, Section 3.4) consists of four exogenous variables (*compliance mechanism, educative mechanism, experience*, and *stakeholder characteristics*) and one endogenous variable (*reasoned risk-taking in decision-making*).

The variable *experience* is constructed from a range of unrelated indicator variables that measure more than one aspect of experience. The indicator variables associated with time or length of experience, such as age, or time as a principal, measure a different aspect of experience than those associated with nature or type of experience, such as district, school type, and questions 27 to 33 and 55 to 57. These aspects of experience may be considered to be composite elements of the construct *experience*. Gefen, Straub and Boudreau (2000, p.31) and Chin (1998, p.306) indicate that variables such as this that account for multiple aspects of a meso-level construct are considered to be formative variables. Similarly, *stakeholder characteristics* is a formative variable in that it is based on multiple unrelated aspects of stakeholders including education district and geographical location, size of school, diversity of cultural composition and questions 34 to 40 and 58.

In contrast, *compliance governance mechanism* and *educative governance mechanism* are reflective variables in that they are made up from indicator variables that are manifestations of the same underlying construct. Gefen, Straub and Boudreau (2000, p.10, 31), Barclay, Thompson and Higgins (1995, p.291), Chin (2001, p.10) and Quaddus (2008, p.18) indicate that the PLS technique supports the analysis of models containing formative variables whereas covariance based SEM are interpreted to support only reflective observed variables. The PLS technique is therefore a more appropriate choice for the model developed in this study.

The PLS program uses maximum likelihood as the method of estimation to analyse the model. Chin (1997), Gefen, Straub and Boudreau (2000, p.9, 28), Barclay, Thompson and Higgins (1995, p.292) and Quaddus and Hofmeyer (2007, p.207) indicate that the sample size required to run a PLS structural equation modeling analysis needs to be either ten times the number of observed variables in the most complex formative construct, or the largest number of antecedent constructs leading to an endogenous construct, whichever is greater. In this study the most complex construct is the endogenous variable (*reasoned risk-taking in decision-making*) which consisted of 8 observed variables, which would require 80 cases in the minimal sample size. The

sample size of 140 meets this criterion. In contrast, covariance based techniques require a larger sample size.

5.2.3 Assessment of the Measurement Model

This part of the analysis examines the measures of the constructs to determine the reliability of the measurement items, the internal consistency of the measures and their discriminant validity. Following assessment of the measurement model the structural part of the model will be analysed to test the hypotheses.

Missing data were dealt with using an estimated means method in SPSS. This procedure was used because it allows all cases to be included in the analysis (Coakes & Steed, 2007, p. 45; Bauer & Bogotch, 2006, p.458). The treatment of missing data requires an assumption of multivariate normality (Arbuckle, 1996, p.243). The data were tested for the assumption of multi-normality using the Kolmogorov-Smirnov normality test that showed the distribution of anomalies in all items, and the skewness and kurtosis of each item. In each case however, the test showed that the item fell within the acceptable range of ±2.

5.3 PLS ANALYSIS FOR MODEL WITHOUT INTERACTIONS

The PLS analysis was run iteratively for a series of nested models. Rigdon (1998, pp.258-259) suggests that alternative models should be analysed with the same data to give further insight into the research model. Where the alternative models are nested the free parameters of one model are a subset of the alternative model. The analysis of nested alternative models will therefore provide the opportunity to distinguish between the models in terms of their consistency with the data and will provide diagnostic information on the primary model of interest (Rigdon, 1998, p.260).

PLS was run initially to analyse the model with no interactions and with the items identified as misfitting or unreliable by Rasch analysis or the Factor analysis deleted. The reliability of each item was assessed by examining the loadings of each measure. In effect, this is a measure of the correlation of each item with its respective construct.

Barclay, Thompson & Higgins (1995, p.295) indicate that items with loadings of 0.7 or greater are acceptable. However, other authors argue that a lower criterion of 0.3 (Quaddus, 2004) or 0.4 (Igbaria, 1997; Hair, 2006) is acceptable. A minimum value of 0.4 was used as the criterion to accept the reliability of individual items for the reflective variables. The results in Table 5.1 below show that items 15, 47, 49 and 50 did not meet this criterion and were therefore dropped from the next iteration of the analysis in order to improve the reliability of retained items.

The weights for each of the formative items are also shown in the table below. For each of the iterations, all formative items were retained. Santosa (2005, p.365) indicates that formative indicators should be treated differently than reflective indicators and compliance with loading criteria is not required.

Table 5.1: PLS Factor Loadings of Items (model with 37 observed variables)

Reflective Items (Observed variables)	**Loading**	**Formative Items (Observed variables)**	**Weight**
Compliance Mechanism		Experience	
Q14	-0.63	Q4	-0.05
Q15	-0.23	Q5	-0.04
Q17	-0.44	Q27	0.17
Q18	-0.56	Q28	-0.10
Q20	0.52	Q30	0.52
Q22	-0.77	Q31	0.47
Q47	0.00	Q32	0.18
Q49	-0.04	Stakeholder characteristics	
Q50	0.28	Q8	0.48
Educative Mechanism		Q10	-0.19
Q24	0.52	Q11	-0.32
Q26	0.85	Q34	0.29
Q51	0.72	Q35	0.08
Q52	0.55	Q36	-0.09
Reasoned Risk-taking in Decision-making	0.54	Q37	-0.26
Q42	0.58	Q39	0.66
Q44	0.59	Q40	0.41
Q46	-0.63		
Q48	-0.44		
Q62	0.68		
Q63	0.76		
Q64	0.45		
Q65	0.58		

5.3.1 The Dilemma of Reversed Coding

Following removal of the reflective indicators (15, 47, 49 and 50) that did not meet the established loading criterion, a revised model was re-run in PLS with 33 observed variables. The reliability of each of the reflective variables in the revised model was found to have a loading of more than 0.4. The numerical values of the loadings were either unaltered or changed marginally by <0.01 for each item. However, the direction of the loadings for all items measuring construct 1, *Compliance Governance Mechanism*, had reversed. In the first iteration, this construct had a negative impact on the dependent variable as predicted by the theory. Following removal of low loading items this effect was reversed to a positive impact, whilst the direction of influence of all other constructs remained unchanged. The results of the second iteration are shown in Table 5.2 for the reflective indicators. The reversed items are highlighted.

Table 5.2: PLS Factor Loadings of Items (model with 33 observed variables)

Reflective Items (Observed variables)	**Loading**
Compliance Mechanism	
Q14	0.65
Q17	0.46
Q18	0.56
Q20	-0.51
Q22	0.78
Educative Mechanism	
Q24	0.53
Q26	0.85
Q51	0.71
Q52	0.55
Reasoned Risk-taking in Decision-making	0.54
Q42	0.57
Q44	0.59
Q46	-0.64
Q48	-0.45
Q62	0.68
Q63	0.75
Q64	0.45
Q65	0.57

In order to investigate this dilemma, a revised model was re-run in PLS with 30 observed variables using a higher threshold value of 0.5 for internal consistency of

items. Items 17, 48 and 64 were removed as they had loadings below 0.5. The reliability of each of the reflective variables in the revised model was again found to have a loading of more than 0.4. The numerical values of the loadings were either unaltered or changed marginally by <0.01 for each item. However, the direction of the loadings for all items measuring construct 1, *Compliance Governance Mechanism*, was again reversed as in the previous iteration of the model. Given that this unanticipated result was not due to the level of the loading criterion of >0.4, further investigation was continued with this criterion.

The model was subsequently re-run iteratively removing each of the items 15, 47, 49 and 50 one at a time. Regardless of order of removal, it was found that the reversal of the direction of the relationship for construct 1 occurred when all four items were removed. The literature was silent on the causes and resolution of the problem of reverse coding. Advice was sought from the creators of PLS, Smart PLS and other users regarding this difficulty. Professor Diogenes Bido (personal email communication, 6 March, 2008) advised that the construct may be comprised of more than one factor. This can be determined by running a principal component analysis with only the nine items for the construct to see how they were grouped. In a prior email (Bido, personal communication, 28 February, 2008) he had indicated that although it is usual practice to drop items with lower loadings for reflective latent variables, it is possible if too many items are dropped, to be left with items that reflect another latent variable than that hypothesised. It was possible that this could be the cause of the reverse coding in this case.

A principal component analysis had already been conducted as part of the methodology. The results of the factor analysis were therefore re-examined in light of the advice on the reverse coding dilemma. On review of the principal factor analysis previously conducted, it was noted that the construct *Compliance Governance Mechanism* was made up of four factors:

- Delegation of authority; perceived control; pressure to align;
- Obligation to comply and be accountable;
- System control of process; lack of perceived control; and
- Perceptions of leaders' preferences.

Each of these factors was supported by the literature (Libby & Fishburn, 1977; Vlek & Stallen, 1980; Hambrick & Mason, 1984; Singh, 1986; Deci & Ryan, 1987; Sitkin & Pablo, 1992; Wiseman & Gomez-Mejia, 1998; Reeve, Nix & Hamm; 2003; Trimmer, 2003a; Trimmer; 2003b; Whiteley A, 2004; Wirtz, Cribb & Barber, 2005; MacNeill & Silcox; 2006) as being as an important component of this construct. Items 49 and 50 both provided a measure of the factor *Perceptions of leaders' preferences* and in removing both items from the analysis there remained no measure of this factor for the construct. On reflection, it appeared that removal of these items had resulted in the construct, *Compliance governance mechanism*, being altered to a different construct from that originally developed in the model. Therefore, in order to analyse the hypothesised model, it was determined that item 50 should be retained. Item 50 had the higher of the loadings of the two items measuring the factor. It is considered valid to include an item with a loading lower than the criterion where there is a legitimate measurement reason for doing so (Barclay, Thompson & Higgins, 1995, p.296; Hulland, 1999, p.198; Plouffe, 2001, p.214). In this case, the rationale was to retain the integrity of the hypothesised construct. The results of the PLS iteration with item 50 retained are shown in Table 5.3 below.

Table 5.3: PLS Factor Loadings of Items (model with 32 observed variables)

Reflective Items (Observed variables)	Loading
Compliance Mechanism	
Q14	-0.65
Q17	-0.44
Q18	-0.55
Q20	0.52
Q22	-0.77
Q50	0.27
Educative Mechanism	
Q24	0.52
Q26	0.85
Q51	0.72
Q52	0.55
Reasoned Risk-taking in Decision-making	
Q42	0.58
Q44	0.59
Q46	-0.63
Q48	-0.44
Q62	0.68
Q63	0.76
Q64	0.45
Q65	0.57

5.3.2 Assessment of the Measurement Model Without Interactions

The internal consistency of each scale was measured using the procedure of Fornell and Larcker (1981). The results are shown in Table 5.4 below. Barclay, Thompson & Higgins (1995, p.297) and Gefen, Straub and Boudreau (2000, pp.34, 37) suggest acceptance of .70 as an acceptable level of construct reliability. All reflective variables have internal consistencies above this cut-off.

Table 5.4: Construct Reliability and Average Variance Extracted (model with 32 observed variables)

Latent Variables	Internal Consistency	Average Variance Extracted (AVE)
Compliance Mechanism	0.71	0.31
Educative Mechanism	0.76	0.46
Experience	0.66 (formative variable)	0.29
Stakeholder Characteristics	0.45 (formative variable)	0.13
Reasoned Risk-taking in Decision-making	0.81	0.36

However, in addition to this requirement, Barclay, Thompson & Higgins (1995, pp.297, 306) indicates that explained variance must always be more than 0.5 otherwise error variance becomes dominating. This is particularly important given the acceptance of items with loadings of 0.4. Average variance extracted (AVE) was found for each latent variable. AVE should be >0.5 to explain variance adequately. In Table 5.4 this requirement is not met for any of the reflective variables. The model was therefore re-run with the items 17, 48 and 64, that had loadings <0.5 removed in order to improve the AVE. Item 50 was retained for the reasons described in Section 5.3.1.

Removal of the three items 17, 48 and 64 improved the AVE for *Compliance Mechanism* to 0.33 and the AVE for *Reasoned Risk-taking in Decision-making* to 0.42. However, the removal again had the effect of reversing the direction of the relationship between these two variables. A further iteration, with item 17 included, and items 48 and 64 excluded, again resulted in a positive correlation between the variables.

The model was subsequently re-run iteratively. With item 17 removed and items 48 and 64 included, the result was a negative correlation of 0.336. With items 17 and 48 removed and item 64 included the correlation changed to a positive result. With items 17 and 64 removed and item 48 included, the result was a negative correlation of 0.351.

The results of the factor analysis were consulted at this point in relation to the construct *Reasoned Risk-taking in Decision-making.* The principal components analysis showed that this construct was made up of five factors:

- Take responsibility to meet outcomes; flexible;
- Necessary to meet needs;
- Pressured and compliant;
- Focus on process; little incentive to take risks; and
- Reference after decision made.

These factors were supported by the results of the qualitative study, feedback from the pilot questionnaire and literature (Baird & Thomas, 1985; Deci & Ryan, 1987; MacCrimmon & Wehrung, 1990; Trimmer, 2003a; Trimmer; 2003b; Soane & Chmiel, 2005; Wirtz, Cribb & Barber, 2005). The fifth component was excluded earlier in the study as it had an eigenvalue less than 1 in the factor analysis. Item 48 was one of three items (46, 48 and 61) developed to provide a measure of the factor *Pressured and Compliant.* Item 61 had been removed at an earlier stage of the analysis as it did not meet the strict measurement requirements for inclusion at the SEM stage of the analysis, leaving only items 46 and 48 as measures of this factor. Removal of item 48 appeared to be a further example of reverse coding where removal of the items resulted in the measured construct being altered to a different construct from that originally developed in the model. Therefore, in order to analyse the hypothesised model, it was determined that item 48 should be retained on the rationale of retaining the integrity of the hypothesised construct, consistent with the argument for retention of item 50 (Barclay, Thompson & Higgins, 1995, p.296; Hulland, 1999, p.198; Plouffe, 2001, p.214).

As the requirement for having AVE for the reflective variables >0.5 still was not satisfied at this point, a further iteration was undertaken with next lowest loading item 18 (loading of -0.50) removed. The AVE for each of the reflective variables was calculated with the low loading items that were argued to be retained removed from the calculation. Removal of item 18 improved the fit as shown in Table 5.5 below.

Table 5.5: Average Variance Extracted of Constructs (model with 29 observed variables)

Latent Variables	Average Variance Extracted (AVE)
Compliance Mechanism	0.48
Educative Mechanism	0.46
Reasoned Risk-taking in Decision-making	0.42

To further improve the AVE results, the next lowest loading item 20 (loading 0.52) was removed. Removal of this item resulted in the reverse coding dilemma recurring. In the factor analysis, item 20 loaded onto the second of the components for the construct *Compliance Governance Mechanism,* Obligation to Comply and be Accountable as listed in Table 4.8. Item 20 was the only item remaining in the analysis that measured this component as the other items developed for this purpose had been removed in the measurement phase (items 13, 21 and 23) or in earlier iterations of the SEM phase (item 47). As a consequence, item 20 was retained as the sole measure of this factor of the construct *Compliance Governance Mechanism*.

The next lowest loading items were 65 and 24, with loadings of 0.54 and 0.52 respectively. With these two items removed, the calculated AVE met the required criterion for the two exogenous reflective variables. Rahim, Antonioni and Psenicka (2001, p.200) indicate “that it is not uncommon to have unsatisfactory fit when measurement models have more than four or five items per factor” due to high levels of random error. A minimum of two indicator variables per construct is considered sufficient to meet the measurement requirements for SEM (Kline, 1998, pp. 203-205; Rahim, Antonioni & Psenicka, 2001, p.200).

Table 5.6: Average Variance Extracted of Constructs (model with 30 observed variables)

Latent Variables	Average Variance Extracted (AVE)
Compliance Mechanism	0.66
Educative Mechanism	0.56
Reasoned Risk-taking in Decision-making	0.46

A final iteration was run with item 46 (loading 0.60) excluded. Exclusion of this item improved the AVE of the final reflective variable *Reasoned Risk-taking in Decision-making* to 0.52, meeting the requirements of Barclay, Thompson and Higgins (1995, pp.297, 306) in relation to error variance. Removal of this item however, resulted in recurrence of the reverse coding dilemma. After scrutiny of the factor analysis this item was retained for reasons as outlined in Section 5.3.1.

This model with 29 indicators was finally analysed in relation to discriminant validity. Each construct within the structural model needs to be statistically different from the other constructs. Discriminant validity was determined by examining the average variance shared between a construct and its indicative measures using the Fornell and Larcker (1981) procedure. A construct that is different to other constructs will share more variance with its indicative measures than it shares with other constructs that make up the model. To satisfy the requirements for discriminant validity (Hulland, 1999, p.200; Gefen, Straub & Boudreau, 2000, p.37; Holmes-Smith, 2000; Quaddus & Achjari, 2005, p.139; Quaddus & Hofmeyer, 2007, p.208) the correlation between other constructs should be less than the square-root of the average variance extracted for the two constructs. By examining the square-root of the values on the diagonal in Table 5.7, it can be seen that this requirement was met for each of the reflective variables.

Table 5.7: Construct Discriminant Validity (model with 29 observed variables)

	Compliance Mechanism	**Educative Mechanism**	**Reasoned Risk-taking in Decision-making**
Compliance Mechanism	**0.81**		
Educative Mechanism	0.41	**0. 76**	
Reasoned Risk-taking in Decision-making	-0.54	-0.36	**0.72**

Conversely, discriminant validity also requires that each individual item should load more highly on the construct it is intended to measure than any other construct in the model (Barclay, Thompson & Higgins, 1995, p.296; Quaddus & Hofmeyer, 2007, p.208). This aspect of discriminant validity is confirmed by scrutiny of the cross-loading matrix shown in Table 5.8. There are several items that correlate more highly on construct 1 than item 50, the item with a low loading that was considered and included to ensure integrity of the construct after an examination of the factor analysis. This was an anticipated outcome given the low loading. In addition, four formative items do not cross-load highly. This was not a concern as Santosa (2005, p. 365) indicates that loadings should not be tested for formative constructs.

Table 5.8: Loadings and Cross-Loadings of Measures

	Compliance Governance Mechanism	Educative Governance Mechanism	Experience	Stakeholder Characteristics	Reasoned risk-taking in decision-making
Q14	**-0.76**	-0.30	0.36	0.31	0.41
Q20	**-0.76**	-0.19	0.25	0.27	0.43
Q22	**0.53**	0.34	-0.16	-0.11	-0.26
Q50	**0.27**	0.35	-0.21	-0.14	-0.10
Q26	0.50	**0.84**	-0.35	-0.14	-0.34
Q51	0.20	**0.79**	-0.41	-0.26	-0.27
Q52	-0.02	**0.59**	-0.30	-0.07	-0.08
Q4	0.11	0.06	**-0.37**	-0.02	-0.21
Q5	0.00	-0.02	**0.17**	0.02	0.10
Q27	0.02	0.02	**0.20**	0.09	0.12
Q28	0.16	0.21	**-0.12**	-0.10	-0.07
Q30	-0.29	-0.39	**0.82**	0.34	0.48
Q31	-0.40	-0.42	**0.86**	0.31	0.50
Q32	-0.23	-0.33	**0.63**	0.24	0.36
Q34	-0.17	-0.13	0.37	**0.53**	0.23
Q35	-0.11	0.04	-0.06	**0.02**	0.01
Q36	0.04	0.11	-0.13	**0.02**	0.01
Q37	0.14	0.24	-0.02	**-0.31**	-0.14
Q39	-0.24	-0.04	0.17	**0.66**	0.29
Q40	-0.17	-0.10	0.22	**0.60**	0.26
Q8	-0.08	-0.12	0.17	**0.21**	0.09
Q10	-0.13	-0.11	0.16	**0.23**	0.10
Q11	0.05	0.03	0.02	**-0.05**	-0.02
Q42	-0.24	-0.09	0.36	0.37	**0.60**
Q44	-0.36	-0.15	0.42	0.33	**0.66**
Q46	-0.33	-0.36	0.38	0.24	**0.67**
Q48	-0.28	-0.46	0.49	0.32	**0.76**
Q62	0.55	0.18	-0.35	-0.23	**-0.65**
Q63	0.25	0.04	-0.14	-0.17	**-0.44**

5.4 PLS ANALYSIS FOR MODEL WITH INTERACTIONS

To test the hypotheses that the construct *Experience* has a moderating effect on *Governance Mechanism*, an analysis was undertaken of the model with two additional interaction constructs included. The use of product variables to estimate interaction effects of two latent variables in a model was formulated by Kenny and Judd (1984) and evaluated by Joreskog and Yang (1996). Joreskog and Yang conclude that one product variable is sufficient to estimate the model and the use of four product variables as suggested by Kenny and Judd is not necessary. In this study one product variable was created for each interaction; *Compliance Governance MechanismXExperience* and

for *Educative Governance MechanismXExperience. Compliance Governance Mechanism* has four indicators and *Experience* has five indicators, resulting in 20 observed variables for the product variable *ComplianceXExperience. Educative Governance Mechanism* has three indicators, resulting in 15 observed variables for the product variable *EducativeXExperience.* With these additional variables the model has a total of 64 observed variables. Table 5.9 below shows the results of this analysis.

Table 5.9: PLS Factor Loadings of Items (model with 64 observed variables)

Reflective Items (Observed variables)	**Loading**	**Formative Items (Observed variables)**	**Weight**
Compliance Mechanism		Experience	
Q14	-0.76	Q4	-0.11
Q20	0.53	Q5	-0.03
Q22	-0.76	Q27	0.16
Q50	0.27	Q28	-0.07
Educative Mechanism		Q30	0.48
Q26	0.87	Q31	0.50
Q51	0.69	Q32	0.16
Q52	0.21	Stakeholder characteristics	
Reasoned Risk-taking in Decision-making		Q8	0.43
Q42	0.59	Q10	-0.06
Q44	0.65	Q11	-0.25
Q46	-0.65	Q34	0.32
Q48	-0.44	Q35	0.05
Q62	0.67	Q36	-0.03
Q63	0.76	Q37	-0.27
ComplianceXExperience		Q39	0.65
Q14XQ27	0.63	Q40	0.38
Q14 XQ28	0.46	Education XExperience	
Q14XQ30	0.83	Q26 XQ27	-0.30
Q14 XQ31	0.83	Q26 XQ28	-0.41
Q14XQ32	0.79	Q26 XQ30	0.61
Q20 XQ27	-0.07	Q26 XQ31	0.50
Q20 XQ28	-0.17	Q26 XQ32	0.26
Q20 XQ30	0.41	Q51 XQ27	-0.27
Q20 XQ31	0.44	Q51 XQ28	-0.36
Q20 XQ32	0.24	Q51 XQ30	0.58
Q22 XQ27	0.64	Q51 XQ31	0.48
Q22XQ28	0.37	Q51 XQ32	0.30
Q22 XQ30	0.82	Q52 XQ27	-0.02

Q22XQ31	0.82	Q52 XQ28	-0.19
Q22 XQ32	0.79	Q52 XQ30	0.78
Q50XQ27	0.04	Q52 XQ31	0.70
Q50XQ28	-0.11	Q52 XQ32	0.49
Q50XQ30	0.52		
Q50XQ31	0.52		
Q50XQ32	0.36		

A minimum value of 0.4 was used as the criterion to accept the reliability of individual items for the reflective variables. The results in Table 5.9 show that 14 items (22X28, 50X28, 50X32, 50X27, 20X27, 20X28, 20X32, 51X28, 26X32, 51X27, 52X27, 52X28, 26X27, and 51X32) did not meet this criterion and were therefore dropped from further iterations of the analysis in order to improve the reliability of retained items. All formative items were retained (Santosa, 2005).

A revised model was re-run in PLS with 50 observed variables. The reliability of one of the interaction items for the construct *EducationXExperience* (26X28) in the revised model was found to have a loading of less than 0.4 and was therefore dropped from further analysis in order to further improve the reliability of retained items. All formative items were again retained (Santosa, 2005).

A revised model was re-run in PLS with 49 observed variables. The reliability of each of the reflective variables in the revised model was found to have a loading of more than 0.4. Table 5.10 shows the loadings of the reflective indicators.

Table 5.10: PLS Factor Loadings of Items (model with 49 observed variables)

Reflective Items (Observed variables)	Loading	Reflective Items (Observed variables)	Loading
Compliance Mechanism		ComplianceXExperience	
Q14	-0.76	Q14XQ27	0.67
Q20	0.52	Q14XQ28	0.49
Q22	-0.76	Q14XQ30	0.84
Q50	0.27	Q14 XQ31	0.84
Educative Mechanism		Q14XQ32	0.79
Q26	0.87	Q20XQ30	0.44
Q51	0.69	Q20XQ31	0.46
Q52	0.55	Q22 XQ27	0.65
Reasoned Risk-taking in Decision-making		Q22 XQ30	0.82
Q42	0.59	Q22XQ31	0.81
Q44	0.66	Q22 XQ32	0.76
Q46	-0.65	Q50XQ30	0.52
Q48	-0.44	Q50XQ31	0.51
Q62	0.66	Education XExperience	
Q63	0.76	Q26 XQ30	0.68
		Q26 XQ31	0.62
		Q51 XQ30	0.71
		Q51 XQ31	0.62
		Q52 XQ30	0.87
		Q52 XQ31	0.82
		Q52 XQ32	0.63

5.4.1 Assessment of the Measurement Model with Interactions

The internal consistency of each interactive variable scale is shown in Table 5.11. These reflective variables have internal consistencies above the 0.70 cut-off showing an acceptable level of construct reliability. AVE is <0.5 for one of these variables which fails to meet the requirement by Barclay, Thompson and Higgins (1995, p.297,306) for explained variance to be greater than error variance.

Table 5.11: Construct Reliability and Average Variance Extracted (model with 49 observed variables)

Latent Variables	Internal Consistency	Average Variance Extracted (AVE)
ComplianceXExperience	0.91	0.46
EducativeXExperience	0.88	0.51

A further iteration of the model with interactions was run with indicators with loadings <0.5 removed in order to improve the AVE result. Three indicators were removed (20X30, 20X31 and 14X28). This model with 46 indicators met the requirements for AVE.

Table 5.12: Average Variance Extracted (model with 46 observed variables)

Latent Variables	Average Variance Extracted (AVE)
ComplianceXExperience	0.54
EducativeXExperience	0.51

In the final test for discriminant validity the square root of the AVE, shown on the diagonal in Table 5.13 below, is larger than the correlation with other constructs. Table 5.13 shows that there is a lack of discrimination between compliance and the interaction variable *ComplianceXExperience*.

Table 5.13: Construct Discriminant Validity (model with 46 observed variables)

	Compliance mechanism	**Educative mechanism**	**Reasoned risk-taking in decision-making**	**Compliance X Experience**	**EducativeX Experience**
Compliance Mechanism	**0.81**				
Educative Mechanism	0.51	**0.76**			
Reasoned Risk-taking in Decision-making	-0.54	-0.39	**0.72**		
Compliance X Experience	-0.79	-0.48	0.65	**0.73**	
EducativeX Experience	-0.24	0.06	0.37	0.53	**0.71**

The cross-loading matrix shown in the Table 5.14 confirms discriminant validity as each individual item loads more highly on the construct it is intended to measure than any

other construct in the model with the exception of item 50 discussed in Section 5.3.1 (Barclay, Thompson & Higgins, 1995, p.296; Quaddus & Hofmeyer, 2007, p.208). The cross-loadings are not shown for the formative items as Santosa (2005, p. 365) indicates that loadings should not be tested for these constructs.

Table 5.14: Loadings and Cross-Loadings of Measures

	Compliance Governance Mechanism	Educative Governance Mechanism	Experience	Stakeholder Characteristics	Reasoned Risk-taking in Decision-making	Compliance Governance Mechanism X Experience	Educative Governance Mechanism X Experience
Q14	**-0.76**	-0.37	0.36	0.31	0.41	0.72	0.20
Q22	**-0.76**	-0.30	0.25	0.27	0.44	0.66	0.25
Q20	**0.52**	0.39	-0.16	-0.11	-0.26	-0.20	-0.02
Q50	**0.27**	0.30	-0.21	-0.14	-0.10	-0.05	0.04
Q26	0.50	**0.87**	-0.35	-0.14	-0.34	-0.43	0.12
Q51	0.20	**0.68**	-0.41	-0.25	-0.27	-0.30	0.17
Q52	-0.02	**0.20**	-0.30	-0.06	-0.08	-0.06	0.42
Q42	-0.24	-0.06	0.36	0.37	**0.59**	0.32	0.30
Q44	-0.36	-0.22	0.42	0.33	**0.65**	0.45	0.38
Q46	0.55	0.29	-0.35	-0.23	**-0.66**	-0.57	-0.36
Q48	0.25	0.08	-0.14	-0.18	**-0.45**	-0.29	-0.14
Q62	-0.33	-0.33	0.38	0.24	**0.67**	0.42	0.10
Q63	-0.28	-0.43	0.49	0.31	**0.76**	0.39	0.11
Int14x27	-0.60	-0.30	0.36	0.29	0.38	**0.65**	0.18
Int14x30	-0.66	-0.43	0.65	0.45	0.54	**0.84**	0.43
Int14x31	-0.71	-0.47	0.63	0.37	0.51	**0.84**	0.35
Int14x32	-0.68	-0.44	0.55	0.36	0.47	**0.79**	0.29
Int22x27	-0.62	-0.26	0.34	0.28	0.43	**0.67**	0.27
Int22x30	-0.65	-0.40	0.69	0.42	0.56	**0.83**	0.56
Int22x31	-0.72	-0.44	0.64	0.35	0.56	**0.83**	0.43
Int22x32	-0.71	-0.42	0.53	0.37	0.55	**0.78**	0.35
Int50x30	-0.09	-0.12	0.60	0.21	0.36	**0.51**	0.56
Int50x31	-0.13	-0.07	0.56	0.15	0.34	**0.50**	0.48
Int26x30	0.01	0.18	0.59	0.26	0.25	0.33	**0.68**
Int26x31	0.01	0.30	0.55	0.19	0.20	0.28	**0.62**
Int51x30	-0.09	0.26	0.41	0.13	0.20	0.29	**0.71**
Int51x31	-0.13	0.29	0.35	0.03	0.14	0.27	**0.62**
Int52x30	-0.31	-0.17	0.51	0.30	0.40	0.52	**0.87**
Int52x31	-0.35	-0.14	0.46	0.19	0.34	0.49	**0.82**
Int52x32	-0.17	-0.03	0.21	0.11	0.18	0.29	**0.63**

5.5 ASSESSMENT OF THE STRUCTURAL MODEL

The analysis in the above section provided assurance that the measurement model was valid and reliable to a degree that would allow confidence in using the measures to analyse the structural model. This part of the analysis examines the relationships among the constructs to determine whether the measured data support the hypotheses based on the structural model.

The PLS technique utilises a jackknife or a bootstrap procedure to test the significance of parameter estimates (Chin, 1998, pp.318-320; 2001, p.14). This essentially provides a measure of the predictive power of the model in that it demonstrates how much of the variance in the dependent construct is explained by the various antecedent constructs (Barclay, Thompson & Higgins, 1995, p.299). The hypothesised model is useful if it has predictive validity in that the exogenous variables predict the endogenous variable, *reasoned risk-taking in decision-making.* The results shown in Table 5.15 below indicate support for the predictive validity of the constructs, *Experience*, *Compliance Governance Mechanism*, and *Stakeholder Characteristics*, due to the significant association found with *reasoned risk-taking in decision-making.* However, the construct of *Educative Governance Mechanism* failed to show a significant correlation and therefore is considered to have failed the predictive validity test. This means that this factor failed to predict *reasoned risk-taking in decision-making.*

Table 5.15: Results for model with no interactions

Hypothesis	Standardised Path Coefficient	t-value
Compliance ⟶ Reasoned Risk-taking in Decision-making	-0.323	3.55**
Educative ⟶ Reasoned Risk-taking in Decision-making	-0.004	0.05
Experience ⟶ Reasoned Risk-taking in Decision-making	0.384	4.54**
Stakeholder Characteristics ⟶ Reasoned Risk-taking in Decision-making	0.177	2.43*

** $p<0.005$; * $p<0.01$

R^2 for Reasoned Risk-taking in Decision-making = 0.477

Table 5.15 shows the results of structural analysis for the model with no interactions. Hypotheses 1, 2 and 5 are supported. Hypothesis 3 is not supported. The model explains 47.4% of the variance in reasoned risk-taking in decision-making and thus can be deemed adequate. Quaddus and Achjari (2005, p.6) indicate that a value of 25% or more indicates a model with adequate merit.

Table 5.16: Results for Model with Interactions

Hypothesis	Standardised Path Coefficient	t-value
Compliance ⟶ Reasoned Risk-taking in Decision-making	-0.223	2.08**
Educative ⟶ Reasoned Risk-taking in Decision-making	-0.055	0.55
Experience ⟶ Reasoned Risk-taking in Decision-making	0.274	2.38*
ComplianceXExperience ⟶ Reasoned Risk-taking in Decision-making	0.15	1.19
EducativeXExperience ⟶ Reasoned Risk-taking in Decision-making	0.029	0.32
Stakeholder Characteristics ⟶ Reasoned Risk-taking in Decision-making	0.164	2.27*

** $p<0.005$; * $p<0.025$

R^2 for Reasoned Risk-taking in Decision-making = 0.483

Table 5.16 above shows the results of structural analysis for the model with multiplicative interaction items. Hypotheses 1, 2 and 5 are supported. Hypotheses 3, 4a and 4b are not supported. The model explains 47.4% of the variance in reasoned risk-taking in decision-making and thus can be deemed adequate.

5.6 MULTI-GROUP MODELING

Multi-group modeling was conducted on the model without interactions, to determine whether the model showed differences in applicability when divided into groups based on measures of experience. This provides an alternative method for looking at the moderating effect of the construct *Experience*. This approach tests the moderating effect of *Experience* on the model as a whole whereas the previous interactive analysis looked at the moderating effect on specific paths in the model.

Chin (2004) indicates that this can be approached by taking the standard errors for the structural paths provided by PLS-Graph in the bootstrap output and calculating the t-test for the difference in paths between groups. He recommends use of the Smith-Satterthwaite test if the variance of the samples are assumed different, as is the case in this example.

$$t = \frac{Path_{sample\_1} - Path_{sample\_2}}{\sqrt{SE^2_{sample\_1} + SE^2_{sample\_2}}} \qquad \text{with m+n-2 degrees of freedom.}$$

Prior analyses were reviewed to determine measures of the construct *Experience* that were most suitable for a multi-group analysis. Item 4 "*Do you hold the role of principal substantively*" and item 5 "*How long have you been employed in the role of principal*" are the two demographic items measuring experience that were robust enough to remain through each stage of the analysis. They showed sound measurement properties in the Rasch analysis, loaded strongly to the construct experience in the factor analysis and met the requirements of reliability, consistency and validity for the SEM measurement model.

Review of the descriptive statistics for each of these items showed that item 4 was not suitable for multi-group analysis as the number of principals in each of the two groups, substantive principals and acting principals was too skewed, with only 13% of principals responding being in acting positions. Item 5, however, showed a spread of responses

across the categories. Regrouping item 5 “time as principal” into two categories; <5 years and ≥5 years provided two groups with 40% and 60% of responses respectively.

In addition, a multi-group analysis by item 9 school type was conducted. Item 9 showed sound measurement properties in the Rasch analysis, but was deleted as a measure of experience in the factor analysis as it was measuring type of experience and did not correlate highly with the other items. This demographic item was often referred to by principals in the preliminary interviews as being significant in whether to take risks in decision-making. It was determined that this provided a reasonable case for looking at principals in different types of schools. The original categories were regrouped into primary and district high schools, with 66% of responses, and secondary schools including agricultural and senior colleges, with 34%.

The data was also split into groups based on agreement or disagreement to two key *experience* questions. The questions were selected based on robustness determined through the analysis. They showed sound measurement properties in the Rasch analysis and loaded strongly to the construct experience in the factor analysis. Items 30 and 31 were selected as they had the highest loadings and met the requirements of reliability, consistency and validity for the SEM measurement model.

Q30	In my experience, I have found that I am best placed to make decisions concerning my school rather than relying on the regulatory framework.
Q31	In my experience, I have found that centrally made policies are not always appropriate to local circumstances.

5.6.1 Multi-group Model by Item 5 – Time as Principal

The multi-group analysis by item 5 was unsuccessful. For the group≥5 years a PLS processing error occurred as the covariance of the indicators was not positive definite. As a consequence the results of the analysis must be considered invalid and have not been included for further consideration.

5.6.2 Multi-group Model by Item 9 – School Type

The multi-group analysis by item 9 school type was conducted as there was evidence from the preliminary interviews that type of experience would impact on risk-taking in decision-making. This item also met the measurement requirements in the Rasch analysis and had a reasonable spread of responses across each of the school types. The results of the multi-group analysis by school type are shown in Table 5.17 below.

Table 5.17: PLS Factor Loadings of Items (model with 29 observed variables)

Primary or District High School		**Secondary (inc agricultural & senior colleges)**	
Items (Observed variables)	**Loading**	**Items (Observed variables)**	**Loading**
Compliance Mechanism		Compliance Mechanism	
Q14	-0.78	Q14	-0.63
Q17	-0.39	Q17	-0.56
Q22	-0.78	Q22	-0.75
Q50	0.24	Q50	0.16
Educative Mechanism		Educative Mechanism	
Q26	0.88	Q26	0.83
Q51	0.70	Q51	0.62
Q52	0.57	Q52	0.39
Experience	Weight	Experience	Weight
Q4	0.05	Q4	0.01
Q5	0.15	Q5	-0.08
Q27	0.09	Q27	0.27
Q28	-0.06	Q28	-0.30
Q30	0.49	Q30	0.52
Q31	0.52	Q31	0.40
Q32	0.23	Q32	0.07
Stakeholder Characteristics	Weight	Stakeholder Characteristics	Weight
Q8	0.31	Q8	0.75
Q10	-0.21	Q10	-0.46
Q11	-0.38	Q11	-0.10
Q34	0.28	Q34	0.18
Q35	0.01	Q35	0.14
Q36	-0.00	Q36	-0.16
Q37	0.05	Q37	-0.32
Q39	0.56	Q39	0.78
Q40	0.63	Q40	0.00
Reasoned Risk-taking in Decision-making	Loading	Reasoned Risk-taking in Decision-making	Loading

Q42	0.64	Q42	0.36
Q44	0.63	Q44	0.50
Q46	-0.67	Q46	-0.66
Q48	-0.37	Q48	-0.62
Q62	0.70	Q62	0.62
Q63	0.73	Q63	0.73

Items with loadings > 0.4 for at least one of the groups have been retained in order for a direct comparison between the model for each group to take place. The internal consistency of each scale is shown in Table 5.18 below. For the Primary and District High School group, the reflective variable, *Compliance Governance Mechanism* had an internal consistency marginally below the cut-off of 0.7. For the Secondary group this was similarly the case for the *Educative Governance Mechanism* variable. For the Secondary group the value for AVE was also marginally too low for the construct *Reasoned Risk-taking in Decision-making.* For both groups of schools the values for discriminant validity showed satisfactory discrimination between the exogenous variables and the dependent variables.

Table 5.18: Construct Reliability and Average Variance Extracted (model with 29 observed variables)

Primary or District High School		
Latent Variables	Internal Consistency	Average Variance Extracted (AVE)
Compliance Mechanism	0.67	0.65
Educative Mechanism	0.78	0.58
Reasoned Risk-taking in Decision-making	0.81	0.54
Secondary (inc agricultural & senior colleges)		
Latent Variables	Internal Consistency	Average Variance Extracted (AVE)
Compliance Mechanism	0.74	0.64
Educative Mechanism	0.67	0.55
Reasoned Risk-taking in Decision-making	0.81	0.47

Table 5.19: Construct Discriminant Validity (model with 29 observed variables)

Primary or District High School			
	Compliance Mechanism	Educative Mechanism	Reasoned Risk-taking in Decision-making
Compliance Mechanism	**0.81**		
Educative Mechanism	0.47	**0.76**	
Reasoned Risk-taking in Decision-making	-0.52	-0.25	**0.74**
Secondary (inc agricultural & senior colleges)			
	Compliance Mechanism	Educative Mechanism	Reasoned Risk-taking in Decision-making
Compliance Mechanism	**0.80**		
Educative Mechanism	0.48	**0.74**	
Reasoned Risk-taking in Decision-making	-0.61	-0.56	**0.69**

Table 5.20: Results for Structural Model

	Primary and DHS (n=89)		**Secondary** (n=47)		
Hypothesis	Standardised Path Coefficient	t-value	Standardised Path Coefficient	t-value	Multi group t-value (df=134)
Compliance ⟶ Reasoned Risk-taking in Decision-making	-0.394	4.82***	-0.256	1.53*	0.74
Educative ⟶ Reasoned Risk-taking in Decision-making	0.108	1.26	-0.275	1.77**	2.31**
Experience ⟶ Reasoned Risk-taking in Decision-making	0.431	4.77***	0.158	1.64*	1.55*
Stakeholder Characteristics ⟶ Reasoned Risk-taking in Decision-making	0.251	2.82***	0.335	1.91**	0.43
R^2 for Reasoned Risk-taking in Decision-making	0.521		0.598		

*** p<0.005; p<0.05**; p<0.10*

Table 5.20 shows the results of structural analysis. Hypotheses 1, 2, 3 and 5 are supported in both the primary and secondary school groups. The model explains 52.1% and 59.8% of the variance in reasoned risk-taking in decision-making in the primary and secondary groups respectively and thus can be deemed an adequate model for each group. Multi-group analysis was conducted for paths that were found to be significant for at least one group. The multi-group t-values in the last column were found using the Smith-Satterthwaite test. Significant differences were found between the different types of schools for the structural paths of *Educative Compliance Mechanism* on *Reasoned Risk-taking in Decision-making* and for *Experience* on *Reasoned Risk-taking in Decision-making.*

5.6.3 Multi-group Model by Item 30

Item 30 was selected as a robust measure of *experience* based on the Rasch and factor analyses. This item also had high loadings in the SEM measurement analysis and met the requirements of reliability, consistency and validity. The data was also split into groups based on agreement or disagreement to this item (shown below).

Q30	In my experience, I have found that I am best placed to make decisions concerning my school rather than relying on the regulatory framework.

The results of the multi-group analysis are shown in the tables below.

Table 5.21: PLS Factor Loadings of Items (model with 29 observed variables)

Agree		**Disagree**	
Items (Observed variables)	**Loading**	**Items (Observed variables)**	**Loading**
Compliance Mechanism		Compliance Mechanism	
Q14	-0.68	Q14	-0.35
Q20	0.59	Q20	0.49
Q22	-0.76	Q22	-0.78
Q50	-0.06	Q50	0.42
Educative Mechanism		Educative Mechanism	
Q26	0.79	Q26	0.65
Q51	0.34	Q51	0.74
Q52	-0.22	Q52	0.76
Experience	Weight	Experience	Weight
Q4	-0.08	Q4	-0.00
Q5	0.12	Q5	-0.16

Q27	0.11	Q27	0.15
Q28	-0.14	Q28	-0.29
Q30	0.10	Q30	-0.12
Q31	0.49	Q31	0.87
Q32	0.54	Q32	0.23
Stakeholder Characteristics	Weight	Stakeholder Characteristics	Weight
Q8	0.01	Q8	0.43
Q10	-0.42	Q10	0.10
Q11	-0.54	Q11	-0.30
Q34	0.22	Q34	0.28
Q35	0.18	Q35	-0.07
Q36	0.41	Q36	-0.19
Q37	-0.26	Q37	-0.54
Q39	0.82	Q39	0.60
Q40	0.22	Q40	0.31
Reasoned Risk-taking in Decision-making	Loading	Reasoned Risk-taking in Decision-making	Loading
Q42	0.30	Q42	0.61
Q44	0.40	Q44	0.54
Q46	-0.63	Q46	-0.64
Q48	-0.48	Q48	-0.42
Q62	0.67	Q62	0.70
Q63	0.68	Q63	0.74

Items with loadings > 0.4 for at least one of the groups have been retained in order for a direct comparison between the model for each group to take place. The internal consistency of each scale is shown in Table 5.22. For the item 30 Agree group, the reflective variable, *Educative Governance Mechanism* had an internal consistency marginally below the 0.7 cut-off and *Reasoned Risk-taking in Decision-making* had a marginally low AVE. All reflective variables for the Item 30 Disagree group have internal consistencies above the cut-off, but the AVE for *Reasoned Risk-taking in Decision-making* was again marginally low. Discriminant validity met the criterion for each group.

Table 5.22: Construct Reliability and Average Variance Extracted (model with 29 observed variables)

Item 30 - Agree **Latent Variables**	**Internal Consistency**	**Average Variance Extracted (AVE)**
Compliance Mechanism	0.70	0.61
Educative Mechanism	0.61	0.53
Reasoned Risk-taking in Decision-making	0.76	0.46
Item 30 - Disagree **Latent Variables**	**Internal Consistency**	**Average Variance Extracted (AVE)**
Compliance Mechanism	0.72	0.63
Educative Mechanism	0.75	0.55
Reasoned Risk-taking in Decision-making	0.80	0.49

Table 5.23: Construct Discriminant Validity (model with 29 observed variables)

Item 30 - Agree			
	Compliance Mechanism	Educative Mechanism	Reasoned Risk-taking in Decision-making
Compliance Mechanism	**0.78**		
Educative Mechanism	0.57	**0.73**	
Reasoned Risk-taking in Decision-making	-0.58	-0.49	**0.68**
Item 30 - disagree			
	Compliance Mechanism	Educative Mechanism	Reasoned Risk-taking in Decision-making
Compliance Mechanism	**0.79**		
Educative Mechanism	0.47	**0.74**	
Reasoned Risk-taking in Decision-making	-0.53	-0.35	**0.70**

Table 5.24: Results for Structural Model

	Item 30 Agree (n=67)		**Item 30 Disagree** (n=60)		
Hypothesis	Standardised Path Coefficient	t-value	Standardised Path Coefficient	t-value	Multi group t-value (df=125)
Compliance ⟶ Reasoned Risk-taking in Decision-making	-0.192	2.00**	-0.391	2.52**	8.48***
Educative ⟶ Reasoned Risk-taking in Decision-making	-0.323	2.56**	0.153	1.26	2.77***
Experience ⟶ Reasoned Risk-taking in Decision-making	0.258	2.50**	0..432	2.64**	0.99
Stakeholder Characteristics ⟶ Reasoned Risk-taking in Decision-making	0.382	3.14***	0.269	2.57**	0.59
R^2 for Reasoned Risk-taking in Decision-making	0.548		0.471		

*** p<0.005; p<0.05**; p<0.10*

Table 5.24 above shows the results of structural analysis. Hypotheses 1, 2, 3 and 5 are supported for both agree and disagree groups. The model explains 54.8% and 47.1% of the variance in reasoned risk-taking in decision-making in the two groups respectively and thus can be deemed an adequate model for each group. Multi-group analysis was conducted for paths that were found to be significant for both groups.

5.6.4 Multi-group Model by Item 31

Item 31 was selected as a robust measure of *experience* based on the Rasch and factor analyses. This item also had high loadings in the structural equation modeling measurement analysis and met the requirements of reliability, consistency and validity. The data was also split into groups based on agreement or disagreement to this item (shown below).

Q31	In my experience, I have found that centrally made policies are not always appropriate to local circumstances.

The results of the multi-group analysis are shown in the tables below.

Table 5.25: PLS Factor Loadings of Items (model with 29 observed variables)

Agree		**Disagree**	
Items (Observed variables)	**Loading**	**Items (Observed variables)**	**Loading**
Compliance Mechanism		Compliance Mechanism	
Q14	-0.60	Q14	0.47
Q20	0.44	Q20	0.10
Q22	-0.79	Q22	0.64
Q50	0.16	Q50	-0.44
Educative Mechanism		Educative Mechanism	
Q26	0.87	Q26	0.60
Q51	0.62	Q51	0.27
Q52	0.39	Q52	0.85
Experience	Weight	Experience	Weight
Q4	0.13	Q4	-0.53
Q5	-0.00	Q5	-0.46
Q27	0.01	Q27	0.35
Q28	-0.03	Q28	-0.28
Q30	0.70	Q30	0.73
Q31	0.16	Q31	-0.76
Q32	0.37	Q32	0.14
Stakeholder Characteristics	Weight	Stakeholder Characteristics	Weight
Q8	0.24	Q8	0.92
Q10	-0.21	Q10	-0.45
Q11	-0.53	Q11	0.10
Q34	0.13	Q34	0.06
Q35	0.34	Q35	-0.11
Q36	0.04	Q36	-0.59
Q37	-0.09	Q37	-0.54
Q39	0.88	Q39	0.53
Q40	0.25	Q40	0.29
Reasoned Risk-taking in Decision-making	Loading	Reasoned Risk-taking in Decision-making	Loading
Q42	0.44	Q42	0.69
Q44	0.45	Q44	0.65
Q46	-0.68	Q46	-0.25
Q48	-0.50	Q48	-0.46
Q62	0.60	Q62	0.63
Q63	0.63	Q63	0.89

Items with loadings > 0.4 for at least one of the groups have been retained in order for a direct comparison between the model for each group to take place. The internal consistency of each scale is shown in Table 5.26 below. All reflective variables for the Item 31 Agree group have internal consistencies above the 0.7 cut-off. For the item 31 Disagree group, both of the reflective variables, *Compliance* and *Educative Mechanism* had internal consistencies below this cut-off, indicating low construct reliability. The AVE was marginally low for *Reasoned Risk-taking in Decision-making* for the Agree group. The values for discriminant validity also showed that there was a satisfactory level of discrimination between the exogenous variables and the dependent variables for both Agree and Disagree groups.

Table 5.26: Construct Reliability and Average Variance Extracted (model with 29 observed variables)

Item 31 - Agree		
Latent Variables	Internal Consistency	Average Variance Extracted (AVE)
Compliance Mechanism	0.70	0.62
Educative Mechanism	0.71	0.54
Reasoned Risk-taking in Decision-making	0.77	0.45
Item 31 - disagree		
Latent Variables	Internal Consistency	Average Variance Extracted (AVE)
Compliance Mechanism	0.52	0.66
Educative Mechanism	0.58	0.57
Reasoned Risk-taking in Decision-making	0.83	0.58

Average variance extracted (AVE) was found for each latent variable. Three values show unacceptable discriminant validity but these were related to formative, not reflective items.

Table 5.27: Construct Discriminant Validity (model with 29 observed variables)

Item 31 - Agree			
	Compliance Mechanism	Educative Mechanism	Reasoned Risk-taking in Decision-making
Compliance Mechanism	**0.79**		
Educative Mechanism	0.49	**0.73**	
Reasoned Risk-taking in Decision-making	-0.49	-0.36	**0.67**
Item 31 - disagree			
	Compliance Mechanism	Educative Mechanism	Reasoned Risk-taking in Decision-making
Compliance Mechanism	**0.81**		
Educative Mechanism	-0.20	**0.75**	
Reasoned Risk-taking in Decision-making	0.56	-0.14	**0.76**

Table 5.28: Results for Structural Model

	Item 31 Agree (n=105)		**Item 31 Disagree** (n=31)		
Hypothesis	Standardised Path Coefficient	t-value	Standardised Path Coefficient	t-value	Multi group t-value (df=134)
Compliance ⟶ Reasoned Risk-taking in Decision-making	-0.321	3.93***	0.278	1.68*	3.71***
Educative ⟶ Reasoned Risk-taking in Decision-making	-0.150	1.10	0.070	0.61*	1.62*
Experience ⟶ Reasoned Risk-taking in Decision-making	0.336	3.52***	0.535	1.86**	0.82
Stakeholder Characteristics ⟶ Reasoned Risk-taking in Decision-making	0.331	2.82***	0.252	1.35*	0.33
R^2 for Reasoned Risk-taking in Decision-making	0.445		0.633		

*** p<0.005; p<0.05**; p<0.10*

Table 5.28 shows the results of structural analysis. Hypotheses 1, 2, 3 and 5 are supported in both the agree and disagree groups. The model explains 44.5% and 63.3% of the variance in reasoned risk-taking in decision-making in the two groups respectively and thus can be deemed an adequate model for each group. Multi-group analysis was conducted for paths that were found to be significant for both groups.

5.7 SUMMARY

This chapter provided a detailed description of the structural equation modeling used to analyse the proposed model and hypotheses. To improve the fit of the model, the PLS procedure was undertaken iteratively until a satisfactory fit of the model was reached. Initially the analysis assessed the relative contribution of each of constructs to the model. The factor loadings for each of the items within each construct were indicated in the tables in Sections 5.3, 5.4 and 5.5. The five latent variables contained 37 items from the original 63 items. In this phase of analysis the number of observed variables was reduced from 37 in the initial model to 29 in the final model. All three of the items deleted in this phase were measures of the same construct *Compliance Governance Mechanism*. The items were deleted as they did not meet the requirements of the measurement model. The retained items were considered to support the convergent validity requirements for the model because they showed significant *t*-values. The parameter estimates and the t-values to determine the paths that were statistically significant were shown.

These results of this PLS analysis were presented in the tables within this chapter. The following and final chapter will discuss the results from this chapter and relate them to the previous chapters to form conclusions about the research questions:

1. How does principal perception of the *regulatory framework* impact on the principals' decision-making process within the school?
2. How does the level of experience of school principals impact on their likelihood to engage in reasoned risk-taking in decision-making?
3. Do stakeholder characteristics for communities and schools impact on risk-taking in decision-making by principals?

Chapter Six will conclude with consideration of the limitations of this study and potential future research that could be undertaken to enhance knowledge of risk-taking in decision-making by school principals.

CHAPTER SIX

6 DISCUSSION AND CONCLUSION

6.1 INTRODUCTION

This chapter discusses the findings in relation to each of the research questions and the degree of support found for the hypotheses arising from the model. It then proceeds to make some more generalised findings in relation to risk-taking in decision-making for school principals. Following discussion of these findings and their implications, the limitations of the research are reviewed and suggestions made for undertaking further research related to this work.

The results show that experience of the principal, the context in which they are making the decision and their perceptions of the decision-making environment all impact on the decision-making process and the degree of risk that will be considered. Experience and stakeholder characteristics were found to have a significant positive effect on risk-taking in decision-making (hypotheses 1 and 5 respectively). Perception of the governance mechanism by principals as a compliance mechanism was found to have significant negative relationship to risk-taking (hypothesis 2). Overall, hypotheses 1, 2 and 5 were supported by all sections of the analysis. Both the model without interactions and the model with multiplicative interaction items showed significant evidence to support these hypotheses. Perception of the governance framework as educative was not found to have any effect on risk-taking in decision-making (hypothesis 3). Hypothesis 3 was not supported by the model with or without interactions. There was some support for the interaction effect of experience and perception of the governance mechanism (hypotheses 4a and 4b). Hypotheses 4a and 4b were only supported by the multi-group analysis for a sub-group of principals. Figure 6.1 shows the paths with significant relationships for the research model presented in Figure 3.1 Section 3.4.

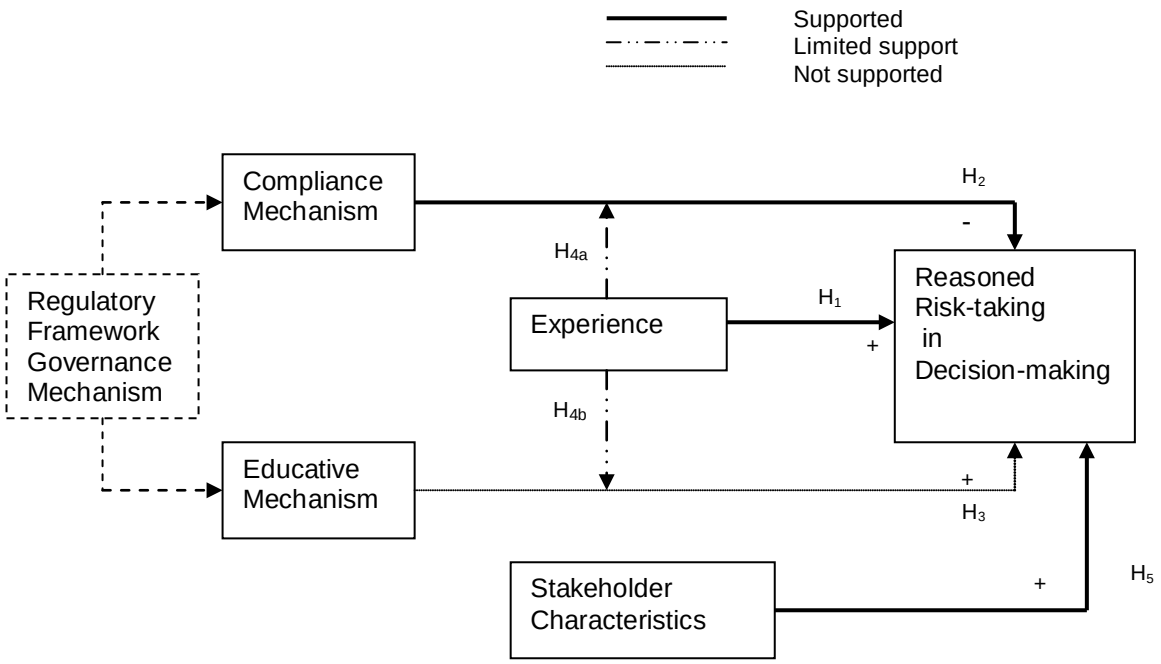


Figure 6.1: Research model showing supported hypotheses

6.2 SUMMARY OF FINDINGS - SUPPORT FOR HYPOTHESES

6.2.1 Hypothesis 1: More experienced principals will tend to engage in risk-taking behaviour more frequently than new or acting principals.

Hypothesis 1 was supported by all sections of the analysis. Both the model without interactions and the model with multiplicative interaction items showed significant evidence to support this hypothesis. In addition, each part of the multi-group analyses supported this hypothesis also.

The analysis of both of the models, with and without interactions, showed that the strongest structural path within the models was between *Experience* and *Reasoned Risk-taking in Decision-making*. The hypothesis is supported with a finding of significant association. This aligns with the findings from the interviews with principals conducted in the preliminary qualitative phase of the research where experienced principals more often indicated that they preferred greater flexibility to make decisions at the school level to meet outcomes that took account of local circumstances. They

expressed a preference for minimal mandatory policy and procedures as they were of the view that their professional expertise would provide sufficient basis for best achieving required outcomes (Trimmer, 2003a, p.34).

This association between *Experience* and *Reasoned Risk-taking in Decision-making* was consistent across principals from all school types in the multi-group analysis, but was greater for primary and district high schools. The multi-group analysis divided by school type showed that greater experience influenced risk-taking in decision-making more for primary and district high school principals. However, the difference between groups was not significant.

In contrast to this finding, secondary school principals more often indicated, in the preliminary qualitative interviews, that they preferred flexibility in decision-making and expressed the view that they had the capacity to make the most appropriate decisions to meet required outcomes in their schools. A possible explanation that accounts for both of these findings is that secondary principals of all levels of experience are more likely to engage in risk-taking in decision-making. The effect of experience would then be more pronounced for primary and district high school principals if they are less likely to take risks generally. This explanation could be tested through follow-up research that looked more closely at the differences in risk-taking in decision-making in different school types.

The effect of greater experience (hypothesis 1) was also supported for both agree and disagree groups of principals as measured by agreement to items 30 and 31. Within each group there was support for hypothesis 1, with principals more likely to make risk related decisions where they had greater experience. However, whilst the standardised path coefficients were larger for the disagree groups in each case, there was no significant difference found between the groups of principals.

Q30	In my experience, I have found that I am best placed to make decisions concerning my school rather than relying on the regulatory framework.
Q31	In my experience, I have found that centrally made policies are not always appropriate to local circumstances.

It is of interest that the structural paths were stronger for the disagree groups, for both parts of the multi-group analysis related to item 30 and item 31. For item 30, this was the group of principals that did not see themselves as best placed to make decisions concerning their school rather than relying on the regulatory framework. For item 31, it was the group of principals that did not agree that centrally made policies are not always appropriate to local circumstances. That is, principals more inclined to agree that policy positions prescribed in the regulatory framework are generally applicable across local circumstances. These results are not inconsistent with the suggested explanation regarding school type. They indicate that where principals see themselves as lacking the experience to make such risk related decisions, they are more likely to do so where they have greater experience. The results are also consistent with the hypothesis of interaction between view of regulatory framework and the level of risk-taking, with a stronger path for experience with more compliant principals. Further research is required to investigate the differential effects of groups of principals with varied experience to obtain more definitive results. The diversity of ways of defining and interpreting experience has been useful in determining a strong effect for experience on risk-taking in decision-making overall. However, it may be the case that different aspects of experience have different impacts when further investigated.

6.2.2 Hypothesis 2: Where school principals interpret the governance mechanism of the regulatory framework as a compliance mechanism, there will be a negative relationship to reasoned risk-taking.

Hypothesis 2 was supported by all sections of the analysis. Both the model without interactions and the model with multiplicative interaction items showed significant evidence to support this hypothesis with a strong negative path coefficient. An interesting outcome of the analysis was the importance of retaining items that represented each aspect of the construct identified through the component factor analysis. When such items were removed the functioning of the construct changed to a positive correlation as the construct was altered to be measuring something different from the original.

Principals in both primary and secondary schools, with a compliance view of the governance mechanism, were less likely to take reasoned risks in decision-making. The multi-group analysis divided by response to items 30 and 31 also both supported hypothesis 2, with a strong negative path between *Compliance Governance Mechanism* and *Reasoned Risk-taking in Decision-making*.

This finding aligns with research conducted over many years on the effect of autonomy and control in decision-making in organisations (Libby & Fishburn, 1977; Vlek & Stallen, 1980; Sitkin & Pablo, 1992; Cooke & Slack, 1991; Child, 1997; Reeve, Nix & Hamm, 2003). It is also consistent with research on the effect of governance structures in education (Minor, 2004; Hoy & Miskel, 2005; Caldwell, 2006; Panova, 2008) that indicates that centralised control of decision-making, level of autonomy and principals' perceptions of preferences of the organisation influence decision-making to minimise risk-taking. This finding has significant implications for the government initiative of Independent Public Schools, which is providing greater autonomy and control to a selected number of government schools in 2010. The concerns raised by principals (Trimmer, 2003) regarding public accountability and scrutiny of decisions as both politically and legally defensible are also supported by this finding as such concerns reduce the propensity of principals to expose themselves to risk in decision-making. The results for Hypothesis 2 are discussed in relation to the theories presented in the Literature Review in Section 6.3.

6.2.3 Hypothesis 3:

Where school principals interpret the governance mechanism of the regulatory framework as an educative mechanism there will be a positive relationship to reasoned risk-taking.

Hypothesis 3 was not supported in the analysis of either model, with or without interactions. However, the multi-group modeling did show significant paths for the effect of *Educative Governance Mechanism* on *Reasoned Risk-taking in Decision-making* for some groups of principals. A significant negative effect was found for secondary principals. This result is contrary to what was anticipated. A significant effect in the expected direction was found for the disagree group of principals on item

30. This is the group of principals that do not see themselves as best placed to make decisions and prefer to rely on the regulatory framework. These results imply that type of experience is having a strong effect that may mask the effect of educative mechanism. The findings for Hypotheses 1 and 4 support this possibility. Further research that includes an additional variable of type of experience, so that primary and secondary principals are analysed separately, would assist in exploring this issue further. This is discussed further under Hypothesis 4 below.

6.2.4 Hypothesis 4a:

There will be an interaction effect between perception of the regulatory framework and experience such that the relationship between the compliance mechanism and reasoned risk-taking is moderated negatively by the experience of principals.

Hypothesis 4b: There will be an interaction effect between perception of the regulatory framework and experience such that the relationship between the educative mechanism and reasoned risk-taking is moderated positively by the experience of principals.

Hypotheses 4a and 4b were not supported by the analysis of the model with interaction items. However, there were mixed results for the multi-group analysis that provide some support for the hypotheses.

Consistent with results of the multi-group analysis divided by school type for hypothesis 1, effect size was greater for principals in primary and district high schools who may be more averse to risk-taking in decision-making. There was a negative relationship between a compliance view and risk-taking for principals of all school types, although it was greater for principals in primary and district high schools. However, this difference was not significant. This provides support for conduct of additional investigation as described in regards to hypothesis 1, but does not provide sufficient evidence to support hypothesis 4a.

Hypothesis 4a was supported, however, by the multi-group analyses by items 30 and 31. For item 30, principals indicated whether they agreed to the statement: "In my experience, I have found that I am best placed to make decisions concerning my school rather than relying on the regulatory framework". Principals in both groups showed a significant negative correlation with *Compliance Governance Mechanism* and *Reasoned Risk-taking in Decision-making*. However, those who disagreed with the statement were significantly less likely to take reasoned risks in decision-making. This finding provides support for hypothesis 4a.

Similarly, for the analysis by item 31, principals in both agree and disagree groups had significant negative structural paths and there was also a significant difference between the groups. Principals who disagreed with the statement were less likely to take reasoned risks in decision-making, again supporting hypothesis 4a.

Secondary school principals with an educative view were less likely to engage in risk-taking in decision-making, whereas primary schools principals with an educative view of governance mechanisms were more likely to do so. This supports hypothesis 4b for primary and district high school principals only. This finding was unexpected and does not support hypothesis 4b for secondary school principals. The relationship between secondary principals' views and risk-taking in decision-making does not have the same impact as for other principal types. The tendency for secondary principals to take greater risks in decision-making irrespective of their view of the governance mechanism appears to dominate. This suggests that even those secondary principals with an educative view are more likely to take greater risks in decision-making.

In the multi-group analysis by items 30 and 31, principals with more experience and with an educative view of governance mechanisms were less likely to engage in risk-taking in decision-making, whereas principals with less experience and with an educative view were more likely to do so. This result provides support for hypothesis 4b for less experienced principals only.

6.2.5 Hypothesis 5: Principals of schools with a high degree of uniqueness in the characteristics of key stakeholders within the communities will be more likely to make decisions involving reasoned risk-taking.

Hypothesis 5 was supported by all sections of the analysis. Both the model without interactions and the model with multiplicative interaction items showed significant evidence to support this hypothesis.

Principals in all types of schools with a high degree of uniqueness were more likely to make decisions involving reasoned risk-taking but there was no significant difference between primary and secondary schools. This supports hypothesis 5. Similarly, in the multi-group analysis by items 30 and 31, principals in schools with a high degree of uniqueness were more likely to make decisions involving reasoned risk-taking regardless of their level of experience, providing support for hypothesis 5.

These results are consistent with comments made by principals in interviews (Trimmer, 2003). The results align with the education literature (Bennis & Nanus, 1985; Hallinger & Heck, 1999; Anderson & Minke, 2007; Fullan, 2007) on the importance of the role of parents and the school community in contributing to decision-making in schools. The results also reflects long established research undertaken in business contexts (Beatty & Zajac, 1994; Carpenter & Westphal, 2001; Carpenter, Pollock & Leary, 2003; Gilley, Walters & Olson, 2002) on the impact of stakeholders on management decisions. There are significant implications in Western Australian government schools that include many schools with highly diverse populations, and schools in remote locations catering to Indigenous students. The results for hypothesis 5 are discussed in relation to the theories presented in the Literature Review in Section 6.3.

6.3 DISCUSSION IN RELATION TO THEORY

6.3.1 Agency theory

The organisational functions of decision management and decision control are quite separate in the structure of the Department of Education and Training in Western Australia. Principals in individual schools are responsible for decision management, which includes the initiation and implementation of decisions on a daily basis. However, decision control, which includes the ratification and monitoring of these decisions, is the responsibility of district and central offices. This structure reflects that described by Fama and Jensen (1983, p.310) for complex organisations, where organisational rules are in place to monitor and constrain the decision behaviour of agents.

The Department has a hierarchical administrative structure with an administrative centre that controls the development of the policies and procedures that make up the governance mechanism of the regulatory framework. This governance framework is compulsory for principals to use in their local decision-making processes in their individual schools. The strategic management structure is such that it reflects a business that can be interpreted from the perspective of agency theory (Jensen & Meckling, 1976; Fama & Jensen 1983; Jensen, 1986, p.323; Rumelt, Schendel & Teece, 1991, p.15). The attitudes and behaviour of principals as measured through the administration of the questionnaire in this study and the support for Hypotheses 1, 2 and 5 provides some evidence that principals will take risks when they perceive that the requirements of the regulatory framework will constrain the outcomes they seek to attain for the students in their school.

In terms of agency theory, as espoused by Fama and Jensen (1983), the principals are responsible for decision management but not the decision control. There is a decision hierarchy, the regulatory framework, in place against which decisions are ratified and against which principals' performance is monitored by district directors on behalf of the Director General. The results of this study are consistent with the expectations of agency theory as it was found, through support for Hypothesis 5, that school principals make management decisions that take account of the needs of their individual school

and community. It is likely that in circumstances where principals perceived a conflict between the desired outcomes for their school and the requirements of the regulatory framework they were prepared to take risks in decision-making.

However, this result is contrary to the assumption of agency theory that managers will behave in ways that are rational, self-interested and opportunistic so as to maximise their own interests (Fama & Jensen, 1983; Hoskisson & Turk, 1990, p.462; Hoskisson et al., 1999, pp.434, 435). The support for Hypothesis 2 implies that principals behaved in ways that were consistent with the overall goals of the organisation. It appears that they may undertake risks in decision-making that make them non-compliant only in circumstances where policies and procedures were constraining them from achieving these broader collective organisational goals. This behaviour aligns with the description of stewardship theory (Davis, Schoorman & Donaldson, 1997; Hoskisson et al., 1999, p.446). According to this theory, the effectiveness of principals' decision-making in schools would be enhanced by the provision of management structures that empowered principals by giving them greater authority and discretion in decision-making. This also aligns with the position of Eisenhardt (1989, p.60) who proposed that when contracts are outcomes based the manager is more likely to align behaviour and decisions with the interests of the shareholder. The results support these views, with principals who had a compliance view of the governance mechanism of the regulatory framework behaving more like agents and taking less risks in decision-making. In contrast, principals with significant experience, who felt empowered to take greater risks, acted more like stewards.

The unpredictability and complexity of the decision-making environment within schools restricts the capacity of principals to consider all possible solutions required by utility theory. The factors identified by Goodwin and Wright (2004, p.23) reflect the types of considerations raised by principals in giving explanations of their decision-making during interviews. In many instances decisions have to be made quickly, with a view to achieving an efficient outcome that has minimal impact on other stakeholders. The experience of the principal in making similar decisions or their awareness of similar decisions made by others previously can assist in this process. Consideration of such factors may frequently result in a trade-off (Soane & Chmiel, 2005). Where time is

critical, the evidence is consistent with the possibility that this may take the form of principals' preference for a pragmatic approach even though this may be contrary to the governance framework. The strong support for Hypothesis 1 and the qualitative data collected support this possibility. For example, principals cited situations (Trimmer, 2003a, p.33) where "sick students whose parent/carer could not be contacted being transported by the school vehicle to medical attention" or where "a student whose parent/carer did not arrive to pick up a child after several hours being transported home after repeated attempts to contact the parent". Principals also traded off accuracy and compliance in order to expend less effort in the situations where they decided to forgo the open and effective competition policy. This policy requires three quotes on purchases from 0-$1000 for many of the small purchases made by schools. Principals indicated that this was time consuming and inefficient (Trimmer, 2003a, p.31). Another trade-off that was in evidence in interviews, was for principals with a compliance view of the regulatory framework to select a strategy and outcome that could be justified publicly. There were a range of examples given where participation in community events or activities were cancelled due to concerns with the schools' capacity to comply with governance requirements for excursions (Trimmer, 2003a, p.31). This tendency for principals to curtail high risk programs due to cumbersome and time consuming procedures has also been noted by Starr (2008, p.5).

These examples of trade-offs, provided by principals, reflect decision-making approaches discussed in the literature for complex situations that include unpredictable and unplanned factors that cannot be considered in determining a solution (Senge, 1990, p.365; Fullan, 1993, p.19). These examples also support the "satisficing" approach described by Cooke and Slack (1991, p.44) and Hoy and Miskel (2005), providing further evidence that principals may utilise "satisficing" as a pragmatic approach to decision-making. It may be that principals tend to operate within a "bounded rationality" framework (Hoy & Miskel, 2005, pp. 300-302). By ignoring complexities within the environment that may impact on the problem or by considering only a limited number of alternatives for solutions, principals can limit the scope of their decisions.

6.3.2 Support for behavioural model of risk-taking in decision-making

The theory that problem framing impacts on decision-making was supported by the finding that principals' perspectives of the governance framework as a compliance mechanism significantly affected risk-taking in decision-making. Theories of decision-making that incorporate constructs such as filtering and problem framing (Hambrick & Mason, 1984; Wiseman & Gomez-Meija, 1998) provide a useful perspective to explain why principals focus on restricted outcome choices when making decisions rather than taking account of all possibilities as predicted by utility or prospect theory. These theories provide a comprehensive view of managerial risk-taking that is impacted by the decision-makers' experience, including their knowledge and values, their perspective of the purpose of the governance framework and the framing of the situation as positive or negative. The findings of this study are consistent with these behavioural models of risk-taking in decision-making. The construct *Experience* in this study included aspects related to whether appointment to the position of principal was substantive; length of time in the role; the relevance of experience to current decision-making situations; past success in taking risk in making decisions; past negative experience and personal tendency to risk aversion; and type of experience such as primary or secondary school. Each of these factors was identified in the factor analysis and the composite formative construct of experience was found to impact significantly on risk-taking in decision-making. In addition, there was also evidence from the multi-group modeling that different aspects of and types of experience impacted on risk-taking behaviour in decision-making. In contrast, no effect was found for other contextual factors such as school size and in previous research these factors have not been generally found to exert any important influence over principal leadership in school settings (Cheng in Bush et al., 1999).

6.3.3 Leadership and decision-making in schools

Experienced principals are more likely to take risks in decision-making to achieve desired outcomes. This aligns with the literature on effective leadership in schools. For example, Mendez-Morse (1992) identified willingness to take risks as one of the characteristics common to successful leaders of educational change. Similarly, risk-

taking was identified by Fullan (1993, pp.26-27) and Caldwell (2006, p.193) as a significant factor in educational leadership.

The contrast in risk-taking behaviour required for management and leadership decision-making was highlighted by Silcox (2003, p.10) in the context of school renewal. Silcox indicated that management required low risk decisions based on established procedures, whereas leadership required higher risk decisions to find solutions in uncertain situations. This distinction is useful in considering why experienced principals take more risks, and also why principals with a compliance view of the governance mechanism take less risks in decision-making. Less experienced principals with a compliance view of the framework may be making low risk decisions that focus on management processes within the school. More experienced principals, on the other hand, are able to make such decisions routinely and have greater capacity to undertake school renewal and educational change agendas within their schools. Decisions related to these high level educational outcomes are not routine and hence require greater risk in determining potential strategies in the decision-making process.

Principals' perception of locus of control has also been identified as a factor that impacts on decision-making in a school renewal process. Silcox (2003, p.12) argued that the principal's perception of their capacity to bring about change and achieve desired outcomes is critical to their decision as to whether to become engaged in school renewal. Locus of control in decision-making was also found to impact on empowerment of principals by Caldwell (2006; p.129) with decentralised decision-making and greater autonomy being related to higher levels of job commitment and satisfaction in self-managed schools where principals had a significant amount of authority in decision-making. While aspects of job satisfaction were not measured in this study, the qualitative interview data supports this view of the impact of locus of control. Principals recounted numerous examples where they felt constrained and frustrated by limitations placed on their decision-making authority. This is also consistent with the finding that experienced principals are more likely to act on such frustration through a heightened propensity for risk.

A related issue is that of confirmation of the correctness or appropriateness of decisions. Less experienced principals with a compliance view of the governance framework were more likely to seek a decision solution that could be verified as correct or appropriate. There were examples provided, particularly in relation to school excursions, where this was a dominant factor in the decision-making process. This tendency fits with the dimension of "decision verifiability" in Fiedler's (1967) theory of leadership effectiveness. Principals are making decisions on high-risk matters, such as excursions, with a focus on the verifiability dimension. Focus on this dimension reduces the focus on other dimensions such as "solution specificity" so other decision solutions that would achieve the required outcome were either discounted or not even considered.

6.3.4 Autonomy and control in decision-making in schools

The number of compulsory policies and procedures on the regulatory framework has continually increased over the past decade maintaining a centralised hierarchical control of decision-making in Western Australian public schools. However, there are currently changes occurring in Western Australia that acknowledge that increased autonomy may be advantageous for decision-making in some government schools. In August 2009, the Western Australian Premier announced a scheme to allow 30 government schools to operate more like independent schools with increased autonomy and flexibility (Bradbury, 2009; Department of Education and Training, 2009; O'Keeffe, 2009, p.4).

Selected schools will be provided with autonomous control such as currently occurs in independent schools. Documents provided to schools by the Corporate Executive of the Department of Education and Training in Western Australia outlined the flexibilities and obligations of "independent public schools" and invited submission of expressions of interest for selection (Department of Education and Training, 2009). With a licence to operate outside of the governance mechanism of the regulatory framework that currently controls their decision-making processes, these schools will have greater autonomy. While there is little public information regarding selection criteria or measures to monitor success, they present an exciting opportunity for future research.

An interesting research question would be to determine whether the schools selected are those that currently have principals who tend to take greater risks in decision-making. Agency theory would predict that this would be the case. Eisenhardt (1989, p.62) proposed that as managers become less risk averse, it becomes more attractive for the shareholder to pass risk to the manager by using an outcomes based contract.

6.3.5 Complexity theory

The operation of the constructs within the hypothesised model may also be explained using complexity theory. The executive hierarchy of the Department of Education and Training is using the regulatory framework as a system to create a controlled and predictable environment that will be compliant with the legislation and regulations related to education and training at state and national levels. The development of policies and procedures that sit below these laws create a system of lawful orders that require compliance and create a mechanism of accountability for the system. Such a structure is consistent with the description by Napoli (2003, p.14) of the need for management to institute systems to maintain predictability and stability in organisations. However, Napoli (2003, p.3) goes on to argue that organisations require managers precisely because predictable and stable organisations are not possible.

Implementation of a system such as the regulatory framework assumes that all principals will interpret and action the policies in a consistent way in the range of circumstances that arise across schools and regions. This approach to corporate governance is common practice across public sector organisations and is consistent with other industrial and service industries (Whiteley A, 2003, p.3). It also assumes that principals will interpret the policies similarly to the central office employers who produced them. The findings of the study provide evidence that both of these assumptions may be flawed.

The rational, empiricist view where universal laws are invariant across societal contexts (Compte in Whiteley A, 2004; & in Bullock, Stallybrass & Trombley, 1988, p.789;

Durkheim in Whiteley A, 2004; & in Bullock, Stallybrass & Trombley, 1988, pp.337, 821) has led to governance environments in public sector organisations where policy writers within a central office of a department develop policies and procedures to be applied universally. The assumptions underlying the governance systems in public sector organisations such as the Department of Education and Training are consistent with the modern mechanistic view of organisations as predictable, controllable mechanical systems (Gharajedaghi, 1999, p10; Hoy & Miskel; 2005, pp.11-12). Hoy and Miskel (2005, p.8) report that early systems analysis of schools came from this perspective, with little or no consideration given to influences or constraints from the external environment. Under this model a hierarchical authority controls the decision-making of individual principals through a requirement for compliance with established rules and regulations. This modernist view also assumes that ultimate truths exist in relation to policy positions and their impact will be consistent across a range of contexts, with policies and procedures consistently applied by all principals in each school type, in each geographical location without regard to contextual issues such as students' needs or community expectations. The policy and procedures documents are deemed to provide an efficient framework for decision-making regardless of the contextual circumstances that apply locally.

The support for hypothesis 5 and the effect of stakeholder characteristics on risk-taking in decision-making provides some evidence that this mechanistic, controlled view of governance and decision-making in this organisation does not adequately describe the behaviour of principals. It was found that stakeholder characteristics have a positive impact on risk-taking in decision-making with principals significantly more likely to engage in risk-taking where contextual factors differed from the norm. Interviews with principals also indicated that policies created centrally to be generally applicable were often not applicable to schools in remote locations or with different cultural characteristics, such as high proportions of Indigenous students or students from a wide range of cultural backgrounds where English is a second language.

The assumption that social structures and organisations can be classified in a modernist, rational way has been challenged previously (Chapman, 1997, p.18; Calas & Smircich; 1999). More complex models have been developed that describe

organisations as “multi-minded sociocultural systems” (Gharajedaghi, 1999, p.12) or as natural or open systems that incorporate a human relations approach to organisational systems (Hoy & Miskel, 2005, pp.13-19). These models are more complex as they recognise the influence of both the external environment and social groups of individuals that may conflict with organisational directions. Within these models, principals have idiosyncratic interests and beliefs and would refer to their own unique beliefs, values and motivations in making organisational decisions. These models are consistent with the hypothesised model in this study, where the perspective of the principal on the purpose of the governance mechanism, their level and type of experience and the context of their school in the form of stakeholder characteristics were all found to impact on risk-taking in decision-making.

To ensure the needs of individual students and the objectives of the organisation were met, principals adapted policy to meet their individual school circumstances and/or made a considered decision not to comply. This approach to decision-making is consistent with Napoli’s (2003, p.4) view of the role of managers in organisations and fits within the complexity paradigm, where managers need to change or bend the rules to ensure that decisions are made and strategies put in place to meet unforeseen and different situations. It also supports Stacey’s (1996, p.22) view that managers are needed because organisations do not run according to a given set of rules, due to the interactions of members of organisations with each other and with stakeholders.

In situations where the principal can predict the consequences of a decision based on past experience, the policy and procedures in the regulatory framework that have been formulated to deal with such circumstances can be applied with reasonable confidence of the outcome. This is because the past experience of many principals has guided the development of the policy and has enabled clear links between cause and effect to be identified. Stacey (1996, pp.27-33) and Napoli (2003, pp.6-9) refer to these situations as being “close to certainty”. In situations far from agreement and certainty, it is not possible for principals to know with any clarity what has caused the change or what the consequences may be. Existing policies and procedures in the regulatory framework are then less effective as they are not directly applicable to the situation and there are likely to be differing perspectives on how to interpret the situation and the appropriate

decision to deal with it. In these circumstances, principals apply problem solving strategies to identify the possible solutions and consequences. Principals in schools with unique stakeholder characteristics more frequently face circumstances far from certainty where they have to make decisions that do not align well to policy and procedures provided in the regulatory framework. These principals were inclined to take risks to meet the needs of their stakeholder communities. Principals with broad experience to bring to the decision-making process were also found to be more likely to take risks in their decision-making to resolve situations far from certainty.

Principals also used the experience of other principals from nearby schools or through their networking mechanisms to assist in their decision-making. Consultation with other principals who had experienced similar circumstances, provided a substitute for direct experience. Napoli (2003, p.11) indicates that in situations far from certainty "people rely more and more on the relationships that they have with each other and the dynamics of those interactions adds to the complexity". Communities of practice (Napoli, 2003, p.56) are a valuable resource to principals who often refer to other principals, particularly those with experience in similar school types or situations, to discuss possible strategies in complex situations.

Consistent with Napoli (2003, p.58), members of the local community also provide networks that assist principals in making decisions that are appropriate and fit the needs of these stakeholders and the wider community. These community networks were more often used by principals in their decision-making where schools were located in remote areas or had significant numbers of Indigenous students. In these schools principals had to consider the cultural implications of any decision if a solution or strategy was to be successful. Seddon, Angus and Poole (1990) express the view that a key impetus for increased community involvement in schooling arises from a democratic sharing of the institutionalised power in the governance of education. They argue that equitable participation and outcomes of schooling requires dissemination of power and control from current hierarchical structures to a more devolved governance through school communities. These findings are also consistent with Mok (2001, p.125) who indicates that the power relationship between managers and stakeholders impacts on the process of governance in the provision of government services such as

education. Research on parental involvement in education has provided evidence that where commitment and responsibility are shared between parents and the school, student educational outcomes are improved (Cavanagh & Dellar, 2003, p.213).

Chaos and complexity theory also allows consideration of a range of contextual factors in decision-making, including economic, political, social and cultural pressures in addition to the values and beliefs of the individual decision-maker. The complexity of these external factors' impact on the school environment is evidenced by the example of current national and state initiatives. These include COAG National Partnerships and Bilateral Agreements that require all State and Territory jurisdictions to collaborate in agreed reform areas. The focus of several identified areas is in closing the gap for sub-groups of the population who are not meeting national benchmarks in literacy and numeracy. At least 9% of school children fail to meet benchmark education levels (McDonald, 2006, p.1). A key rationale behind the Literacy and Numeracy National Partnership Agreement is to raise standards for the students in the tail of the distribution who are currently failing to meet national benchmarks (COAG, 2008). A disproportionate number of these students are either Indigenous or reside in areas of low socio-economic status.

The strategies seek to improve equity in both participation and in achievement of outcomes by improving attendance and in closing the gap in the outcome standards achieved. The National Partnership Agreement on Low Socio-Economic Communities (COAG, 2008) acknowledges that greater principal and school flexibility in decision-making and allocation of resources is a key strategy to assist school leaders in boosting the performance outcomes of students in these communities. The strategies also include recommendations to encourage innovation and flexibility in school operational arrangements so that they can be better tailored to local community needs.

Consideration of the ethic of justice, as described by Shapiro and Stefkovich (2001, p.13), raises the question of whether such equity in participation and achievement of outcomes can be achieved whilst governance mechanisms remain in the control of hierarchical central structures. Principals may encounter constraints in implementing

innovative and flexible strategies that meet the needs of their communities if they are obliged to comply with centrally developed policies and procedures that restrict them in making such decisions. Starr (2008) raises the legitimate concern that the increase in risk management measures for schools may paradoxically create negative educational effects if innovative programs are curtailed due to compliance with governance requirements.

Shapiro and Stefkovich's (2001, p.13) ethic of justice considers equity and equality in relation to the fairness of rules, laws and policies, whether exceptions to them will be considered and under what circumstances. This view makes a clear distinction between consideration of the rights of individual students and their specific educational needs to achieve equity as required in the COAG strategies, and the consistent application of rules and policies equally for all students and school communities. Shapiro and Stefkovich (2001, p.15) indicate that educators need to consider inequities in society such as social class, race and gender in determining who benefits from existing governance structures and which voices are silenced. Within this ethical paradigm, educational hierarchies would need to consider the silenced voices and what the long term effects of policies may have on individuals, the community and society in general. Such an approach may require these educational hierarchies to move from centralised governance mechanisms that impose standard rules and policies applicable to all, to a governance mechanism approach that allows decision-making to be undertaken locally within school communities to promote equity in outcomes above equality and consistency in governance. This style of governance emphasises relationships and connections in individual communities' decision-making by school principals which aligns with the complexity model rather than a positivist approach. It promotes equity in outcomes of schooling as opposed to equality of opportunity to participate in schooling with consistent governance strategies applicable to all students in all circumstances.

The finding that stakeholder characteristics have a positive influence on risk-taking in decision-making is also consistent with the discussion by Brislin (1976, p.16) regarding emic versus etic analysis by principals. Principals' decision-making included consideration and interpretation of local context such as geographical location, cultural

factors, and community requirements as their emic analysis values these local contextual factors as meaningful and important to the decision. The etic that has been developed centrally is also considered, but circumstances arise where the etic analysis is in conflict with the emic. In these circumstances principals may decide to take a risk in decision-making to take greater account of their emic analysis. This is more likely to be the case in remote community schools where needs of students and communities differ markedly from those in more standard metropolitan locations.

The difference in emic and etic for principals in schools with unique stakeholder characteristics may be due to policies being irrelevant or inappropriate for use in these communities. Whether this is because centrally located policy writers developing and writing policy and procedures documents for use by schools are ethnocentric (Calas & Smircich, 1999; Gubrium & Holstein , 2000, p.495) is not clear. However, policies do exist that are more relevant for schools in metropolitan locations with white Caucasian students from middle class family structures. Certainly, the relevance of such policies in other contexts, such as schools within remote Aboriginal communities, needs to be questioned. Principals of such schools are taking greater risks in decision-making, as they require alternative strategies for dealing with issues that arise in their school communities due to the different contexts and circumstances.

Complexity theory provides an alternative to ethnocentricity of policy writers as an explanation of this finding. Within complexity theory we can consider that the policies within the regulatory framework have been developed and written based on the assumption that initial conditions in schools are limited to those defined by the policy. However, the initial conditions in each school and each decision-making circumstance are likely to be unique, even if only in small, indiscernible ways, and complexity theory predicts that even the smallest change in initial conditions within a dynamic system can result in unpredictable and chaotic outcomes (Waldrop, 1993). When initial conditions such as personality and views of the principal; students, their family circumstances and relationships to other community members; wider community response; media intervention; and so on, are taken into consideration it is clear that there is tremendous scope for events to unfold in unpredictable ways. This is particularly the case in schools with greater differences in their initial conditions, such as remote Aboriginal

schools. Within this perspective, principals of these schools need to be empowered to "adapt and evolve through operating optimally as a complex adaptive system" (Lewin, 1999, p.198). The Taylorism command and control style of management (Lewin, 1999, pp.200, 201) that requires adherence to centrally developed governance mechanisms may be appropriate when goals are clear and there is little uncertainty in the environment. However, principals in complex contexts need the capacity to adapt solutions to their specific environments. Lewin argues (1999, p.202) that through encouragement of diversity and distributed control, creativity and adaptability can be achieved in making decisions and resolving problems.

The compromise between the accountability for decision-making required by the public sector environment and legislation under which government schools operate, and the need for empowerment and diversity in decision-making, are not mutually exclusive under the complexity paradigm. The analogy of quantum physics is used by complexity theorists to distinguish between the duality of thinking by people in organisations (Gell-Mann, 1994; Whiteley A, 2003, pp.15-17; Wheatley, 1994, pp.32-43, 65-67; 2006, pp.37-45). In the context of decision-making in government schools this duality could take the form of having the flexibility to make decisions and choose actions to achieve the core values and objectives as outlined in legislation and in the *Plan for Government Schools* without adherence to prescriptive policy and procedures mandated for all schools. This type of approach is aligned with the direction the Department is taking by establishing 'independent public schools'.

6.4 IMPLICATIONS FOR PRACTICE

The findings of the hypothesis testing in this study showed that a principal's view of the purpose of the governance structure, including the regulatory framework, impacted on their risk-taking in decision-making. This can be problematic where it restricts decision-making that may be in the best interest of outcomes for students and also where it exposes principals when they make a professional decision to take a risk and act outside mandatory policy requirements. To avoid this dilemma the establishment of mandatory policy, applicable to all schools, should be minimised. Where it is created, policy and procedures should be developed that is enabling rather than restrictive. This

may be achieved by setting up a structure of common goals or outcomes to be achieved rather than prescribing set procedures. Instead of mandatory policy, non-mandatory guidelines could be developed to provide support and guidance for achievement of these common goals. This study clearly demonstrated the need for such guidance for new and acting principals who do not have the benefit of experience. However, principals with experience, and in particular secondary school principals and principals working in schools with unique characteristics, require flexibility in establishing their own mechanisms and processes to achieve the set goals. Such an approach would enhance the capacity of schools to manage their own affairs and provide opportunities for schools to make decisions that take account of the unique context of their own students and communities.

Literature discussed in Chapter 2 took the view that process driven decision-making that is compliant with centralised policy cannot lead to significant school improvement (Dalton, Fawcett & West-Burnham, 2001). Dalton, Fawcett and West-Burnham's (2001, pp.142-143) analysis of eleven case studies concluded that best practice in educational innovation relies on creativity in decision-making in schools. The conditions for creativity in school decision-making require empowerment to make such decisions without the constraint of a centrally developed governance framework of policies, or the control of a hierarchical structure that holds principals accountable to compliance with its requirements. Dalton and Read (2001, pp.62-63) concur that teachers and school leaders must feel confident to take risks in their decision-making for sustainable change to occur in schools. The confidence level of principals in making these decisions is in turn dependent on the locus of control in decision-making. In the Department of Education and Training in Western Australia this lies within the hierarchical structure of the central and district office. This may change with the introduction of 'independent public schools' in 2010 (Department of Education and Training, 2009).

In 2010 the Department has provided greater flexibility in governance to 34 Independent Public Schools. It is planned to extend this initiative to a broader group of schools in 2011. Whilst it is not yet clear how the success of the initiative will be evaluated, it appears to be an initiative that will assist the schools involved to have

greater capacity and flexibility to undertake decision-making specific to their identified school needs without the risks of non-compliance with centralised policy. It would be of interest to study whether these schools make decisions that are significantly different from those who remain constrained by policy. Complexity theory (Section 2.9) would suggest that this may not occur as the common goals may serve as strange attractors resulting in similar decisions by both groups of principals even though one group is not taking risks by being non-compliant with policy.

In Section 1.3.2 the corporate governance structures and key strategic planning documents for the Department were discussed. These documents provide the broad goals and outcomes for the organisation. However, they do not indicate to what extent devolution of decision-making is provided to school principals. Policies are created centrally by branches within the central office to respond to identified issues and to ensure consistency in approach across schools. However, in Section 2.9, it was discussed that equality of inputs does not necessarily lead to equitable outcomes. It would be of value if the purpose of policy and its relation to the achievement of organisational goals and strategic plans were examined from this perspective as equity in outcomes may be the strategic goal preferred. If so, this is a strategic direction that should be clearly articulated and consistently applied in determining whether a policy is required to be formulated, who it should apply to and the subsequent development of policy documents. Such an analysis would require looking closely at the philosophical assumptions underlying the development of policy in the Department and the extent of devolution of control for decision-making to school principals in relation to policy and broader organisational goals. The overly compliance based approach where principals are required to be familiar with over 140 policy documents covering a wide range of areas and activities could then be reduced. Other mechanisms could be utilised as a means of problem solving as issues arise in the public arena as an alternative to policy development. Introducing other mechanisms would have the advantage of reducing the impact of cultural and geographical factors on the outcomes of decision-making in schools where unique characteristics create issues in being compliant with existing policy.

Principals, particularly new and acting principals, and other stakeholders need to be aware that in order to achieve equitable outcomes for all students policy "should not be applied automatically and inflexibly with no regard to or evaluation of the circumstances or merits in any given case" (Trimmer, 2003a, p.35). Within the current governance structure principals are exposed to risk when they make considered decisions outside of documented policy regardless of the outcomes of the decision. If greater delegation of authority were provided, risk-taking in decision-making would be reduced, and the accountability for professional decision-making that met the agreed outcomes in the governance structure and strategic plans would lie in greater part with the school principal.

For such an approach to be successful, it would be necessary for the Department to provide ongoing professional development and put support strategies in place for decision-making for new and acting principals who do not have the benefit of experience to call upon in making their decisions. This may involve opportunities for experienced principals to share strategies and experience they have gained in a range of circumstances.

6.5 LIMITATIONS AND FUTURE DIRECTIONS

6.5.1 Limitations

This research has made a significant contribution to the body of knowledge regarding the role of governance mechanisms, experience and stakeholder characteristics in explaining risk-taking in decision-making by school principals. There are, however, a number of potential limitations which are important to consider when interpreting the findings and which provide some potential directions for further research.

The data collected for this study is all self-reported by the principals. Although this is a logical and defensible methodology in its own right, it would be useful to conduct further research to analyse the model using data derived from alternative sources. For example, with reference to district directors regarding decisions they have become aware of through the school review process, from parents and community regarding

their input into the decision-making process and from teachers reflecting on decisions they have observed within their school and their outcomes.

Use of a questionnaire had the advantage of allowing an efficient collection of data from a large number of principals located in diverse geographical regions across the state. The response rate was high, however it is difficult to determine the reasons for non-response and this introduces a potential for bias in the data collected. The use of a survey instrument also limits respondents from providing their rationale for the attitude or behaviour included in the items of the questionnaire. A case study approach that involved interviews with principals may provide greater insight into the rationale for decisions and the motivations and deliberations behind them.

A further limitation of this methodology is that it required the data to be collected at one point in time and was therefore reliant on each principal's memory of their prior decision-making behaviour. Different methodologies and paradigms could be used such as conducting a longitudinal study where principals record their decisions, the deliberations leading to them and any outcomes or repercussions, in a journal over a period of time. This approach would enable an examination of the stability of the constructs over time as motivations and environmental influences may vary over time.

It should be noted that while a model was developed in this study that was confirmed by the quantitative analysis, it cannot be presumed that the model could be used to predict decision-making behaviour by a principal or group of principals in a future situation. Confirmation of the paths within the model does not imply causality between any of the modeled constructs and risk-taking in decision-making. Developing an exploratory model does have value in determining which constructs, among many that could be modeled, have some measurable influence on the variable of interest, which assists in progressing knowledge in this area.

Some demographic items which could take on many values were included in the Rasch analysis. Another approach would have been to re-code the items into a limited

number of categories before analysis. Inclusion of the demographic items may have had an effect on the outcomes of the analysis. The Rasch analysis was conducted on a sample size of 140 for the 65 polytomous items. An alternative way of analysing the data using subscales, which provides a more acceptable sample size for Rasch analysis for the responses, was conducted but showed poor fit to the model. The poor fit supports the inference that the scale was not measuring a unidimensional trait but was more likely measuring a dominant trait comprised of several dimensions. Whilst the method used to identify differential item functioning was correctly applied, a more efficient method could have been used that does not involve creating new items by specifying demographic variables as person factors.

6.5.2 Further Research

The results of this study provide a number of ideas and opportunities for further research. For example, the construct experience did not show significant interaction with school type in the multi-group modeling. However, there was some qualitative evidence that school type should be treated independently as a separate construct. In addition, the results showed that having greater experience influenced risk-taking in decision-making more for primary and DHS principals. The hypothesised model could be revised to include school type as a separate construct. School type was included as one of the formative aspects of the construct experience. The factor analysis identified "type of experience" as one of six component factors making up this construct. However, four other factors loaded more highly on the construct and as a consequence the items measuring "type of experience" were dropped from the final analysis. Given the results of the multi-group modeling by school type, there is potential for a further research study to be conducted that distinguishes between school type and experience as separate constructs.

The results of the multi-group analysis suggest that the other constructs in the model operate differently for different school types. Significant differences between all of the structural paths were found between the different types of schools using the Smith-Satterthwaite test. The probability of engaging in risk-taking in decision-making was found to be significantly greater with secondary principals. Principals in primary and

district high schools with a compliance view of the governance mechanism were more likely not to take reasoned risks in decision-making. Where principals held an educative view of governance there were also differences found related to school type. Principals in secondary schools with an educative view were less likely to engage in risk-taking in decision-making, whereas principals in primary schools with an educative view of governance mechanisms were more likely to do so. A subsequent alternative hypothesis for future research could be: Principals with secondary school experience tend to engage in risk-taking behaviour more frequently than primary principals.

School type may also interact with the construct of stakeholder characteristics with principals in secondary schools with a high degree of uniqueness being more likely to make decisions involving reasoned risk-taking than those in primary schools. A deeper understanding of the involvement and influence of stakeholders may be gained by utilizing the approach by Panova (2008, pp. 89-90) where levels of stakeholder participation and influence on higher education institution policies were measured for identified stakeholder groups and policies.

Another potential research opportunity will arise with the move by the Department of Education and Training in Western Australia to create independent public schools, as discussed in Section 6.3.4 that are able to govern autonomously. Decision-making in these schools would no longer be governed by the regulatory framework but by the principal under the authority of a school board. This would create a governance structure similar to independent schools but with a population of students similar to that attending other government schools. A study examining risk-taking in decision-making in government schools with such an autonomous governance structure would provide a new perspective of the government school context in Western Australia that has not been able to be considered in the past.

In this study the data collected fit the hypothesised model to confirm a number of the hypotheses. These results assist in improving understanding of factors that impact on risk-taking in decision-making. However, the epistemological view that was taken for the study means that causality was not assumed and the model is a representation of,

but does not confirm, reality. Taleb (2007, p.268) suggests that we observe data and make models about what the reality may be and then adjust our models in accordance with new information. Suggestions have been made for further research that may achieve this aim. As it stands, this study makes a contribution through the development of a model that has provided some insight into a range of factors found to have an impact on the complex social dynamic of risk-taking in decision-making.

6.6 CONCLUSION

This thesis sought to address a gap in the research by investigating risk-taking in decision-making in a public sector context. It considered traditional theories of organisational functions of decision management and control such as agency theory and also postmodern complexity theory to gain insight into organisational governance structure and functioning. It also considered both probabilistic and behavioural models of risk-taking in decision-making. This broad approach to development of a model and hypotheses for testing provided a bridge between existing literature in business contexts and the context of public sector organisations. The governance structures of government schools in Western Australia were considered in relation to literature on educational leadership nationally and internationally.

The study developed a research model and investigated the association between each of the identified constructs and level of risk-taking in decision-making by school principals. It employed a rigorous approach that involved sequential use of Rasch analysis to develop a robust measurement scale, factor analysis and PLS structural equation modeling to test the hypotheses. In conducting the analysis, a dilemma occurred in relation to reverse coding that had not been previously discussed in the literature. Resolution of this dilemma provides a useful starting point for discussion for other researchers conducting structural equation modeling analyses.

This study has been successful in identifying a range of factors impacting on risk-taking in decision-making by school principals. In relation to the first research question, it has shown that principals' perceptions of the purpose of the governance mechanism of the

regulatory framework impacts on risk-taking in decision-making and that this is mediated by the level and type of experience of the principal. These findings have implications for organisations with governance frameworks based on a compliance approach where control is held within a centralised hierarchical structure.

In regard to the second research question, both the level and type of experience of principals were found to have a significant influence, which raises important questions with regard to Department governance structures and the devolution of control for decision-making and the accountability for outcomes in schools.

For the third research question regarding stakeholder characteristics, it was found that principals' of schools with a high degree of uniqueness were significantly more likely to make decisions involving reasoned risk-taking. This finding has implications for decision-makers in contexts involving Indigenous populations or those with large proportions of migrants or refugees where there are differences in cultures and community needs and where English is a second language. Geographical location is also a consideration and the remote nature of communities where schooling and other public services are delivered is likely to impact on decision-making in those communities.

Overall the study provides an extension of the use of theory in the extant literature to the public sector context through its application to decision-making in government schools. Whilst the results where consistent with agency theory in that management decisions took account of needs of individual schools and the community, there was conflict with the assumption of agency theory as the managers did not make self-interested or opportunistic decisions. Rather the results supported stewardship theory with managers behaving in ways that were consistent with the overall goals of the organisation and the interests of the stakeholders.

The results were consistent with behavioural models of risk-taking in decision-making. Theories of decision-making incorporating filtering and problem framing provided a

useful perspective and aligned more closely with the results than the more probabilistic models of utility and prospect theory.

Chaos and complexity theory provided a useful lens to consider a range of contextual factors in decision-making, including economic, political, social and cultural pressures. This theory was also able to account for the values and beliefs of individual decision-makers. From the perspective of methodology, it was an edifying approach to utilise this philosophical lens in conjunction with quantitative methods and assisted with developing an understanding of the behaviour of principals in a range of diverse environments and contexts. Through the use of complexity theory and quantitative analysis the thesis has demonstrated support for the influence of experience, perceptions of governance compliance mechanisms and stakeholder characteristics on propensity to take risks in decision-making.

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8 APPENDICES

8.1 APPENDIX 1 – SAMPLE INFORMATION LETTER

Karen Trimmer
PO Box 1698
WEST PERTH WA 6872

«Title1» «Name1» «Principal_2006»
Principal
«School_Postal_Name»
«Street»
«Town» WA «Postcode»

Dear «Title1» «Principal_2006»

RESEARCH INTO DECISION-MAKING BY SCHOOL PRINCIPALS

In 2002 you participated in a review of the regulatory framework by the then Department of Education. This review provided feedback to the Department about the efficiency and effectiveness of the Regulatory Framework System, and its use in schools and districts across the State. The data collected from the interviews with principals also provided insight into their use of the regulatory framework in decision-making in schools.

I am writing to advise that as a doctoral student at Curtin Graduate School of Business, I am commencing a study of reasoned risk-taking in decision-making by school principals. Reasoned risk-taking has long been associated with governance mechanisms and research has been conducted in business contexts to develop a theory of risk-taking that incorporates governance mechanisms and stakeholder mechanisms, including the experience of management. I intend to conduct research to explore these theories in the context of the public sector, in particular the environment of public schools.

In the context of the research proposed, risk-taking would occur when decisions are made that are not compliant with the regulatory framework, which is the primary governance mechanism for public schools in Western Australia. An example of risk in this context may be when a principal is potentially exposed to criticism for a decision which fails to comply with established policy. The proposed research seeks to use agency and behavioural perspectives to explore whether reasoned risk-taking by school principals is a consequence of their perceptions of the governance mechanism

of the regulatory framework, the experience of principals or the characteristics of key stakeholders within the school community.

I propose to use the literature reviewed and also the data collected from principals in the 2002 review to determine factors impacting on risk-taking in decision-making by principals and to develop a research model. The Director General of the Department of Education and Training, Mr Paul Albert, has approved my access to the data collected in the review for this purpose. I am also seeking the permission of those who participated in the 2002 study to use their data in this current research. Anonymity and confidentiality of the data will be maintained. I intend to then analyse the model using data collected from a further survey of principals in West Australian government schools.

I would also like to invite you to participate in the further survey to collect the confirmatory data being conducted in September 2006. This is a written survey that will involve your completion of the enclosed questionnaire that should take approximately 15-20 minutes of your time. As this is an independent research project, my Doctoral Supervisors and I will be the only people with access to your completed questionnaire. The study has been approved by the Curtin University Human Research Ethics Committee and all data will be stored consistent with Curtin University's *NHMRC/AVCC Statement and Guidelines on Research Practice*. The data will not be the property of the Department of Education and Training and confidentiality of the data will be maintained in this respect. In addition, anonymity will be assured in use of the data for analysing the model.

Participation in the study is voluntary and if you agree to participate you are free to withdraw at any time. However, your participation would be greatly appreciated as it will be necessary to obtain responses from a wide range of principals with differing views and experience in order to determine the impact of the regulatory framework on local decision-making in schools. I would therefore encourage you to complete the survey and return it in the enclosed reply paid envelope.

If you would like any further information about this proposed research study, please contact me on 0407 902 362 or by email at karen.trimmer@det.wa.edu.au. If you have any concerns about the research on ethical grounds please feel free to contact the Curtin University Human Research Ethics Committee Secretary on 9266 2784 or my research Supervisors at Curtin University's Graduate School of Business, Professor Mohammed Quaddus, on 9266 2862 or Dr Margot Wood, on 9266 3564.

If you are interested to receive a copy of a summary of the findings of the research, this would be provided, for participants of the study, at the conclusion of the research and submission of the thesis, which is scheduled for late 2007.

I would appreciate your support of this research by permission to use your 2002 responses and by your completing and returning the enclosed survey.

Yours sincerely

KAREN TRIMMER

11 September 2006

8.2 APPENDIX 2 - PILOT QUESTIONNAIRE

QUESTIONNAIRE ID

Regulatory framework decision-making by principals

Thank you for taking the time to answer this survey.

Please be assured that your answers are strictly confidential. I will be the only person who will see your individual responses. The survey questionnaires will not be shown to or become the property of the Department of Education and Training. The published results will not identify any individual or school.

For most questions, all you need to do is tick the box which most applies to you.

Please use the rely paid envelope (it doesn't need a stamp) to return the survey to me by
29 September 2006. Your assistance and participation are greatly appreciated.

Demographic Information:

1. Your gender?

Male	Female

2. Your age range?

Up to 30	30 up to 40	40 up to 50	50 or over

3. Highest level of education achieved?

Bachelor	Post Grad Diploma	Masters	Doctorate

4. Do you hold the role of principal substantively?

yes	no

5. How long have you been employed in the role of principal?

Less than 1 year	1 to 2 years	>2 to 5 years	More than 5 years

6. How long have you been employed as a teacher/school administrator?

Less than 5 years	>5 to 10 years	>10 to 20 years	More than 20 years

7. District? _____

8. The location of my school is

Remote	Rural	Regional Centre	Metro

9. School Type

Primary	District High	Secondary	Agricultural College	Senior College

10. School size (number of students) _____

11. The proportion of students at this school who are of Aboriginal or Torres Strait Islander descent is _____%

12. The proportion of students at this school who are from culturally and linguistically diverse backgrounds is _____%

Regulatory Framework Decision-making

		Strongly Agree	Agree	Disagree	Strongly Disagree
13.	The principal is accountable for ensuring that decisions are made in line with the *School Education Act and Regulations* and policy included in the regulatory framework				
14.	The regulatory framework constrains me in my role of principal in making decisions that meet the needs of this school and its students				
15.	As principal, I have control over decision-making in the school				
16.	The consequences of decisions made in line with the regulatory framework are beyond my control				
17.	Principals have the authority to choose the appropriate course of action for the circumstances in their school				
18.	Authority to make decisions is delegated to principals				
19.	The purpose of the regulatory framework is to assure compliance by schools to established policies and procedures				
20.	It is important that principals in all schools are making consistent decisions				
21.	In making decisions I am obligated to comply with courses of action prescribed in the regulatory framework				
22.	I feel pressured to always make decisions in-line with the regulatory framework				

23.	Making decisions in line with the regulatory framework assures that they can be publicly and legally defended regardless of the outcome of the decision				
24.	The purpose of the regulatory framework is to provide advice, instruction, guidance and clarification to assist with decision-making				
25.	The regulatory framework assists me in my role of principal to make decisions that meet the needs of this school and its students				
26.	I am satisfied that the policies in the regulatory framework support outcomes I want to achieve in this school				
27.	I have a lot of experience in making decisions as a school leader				
28.	My capacity to make decisions was a key criterion in being selected for this position as principal				
29.	I don't have a great deal of experience in making decisions as a principal				
30.	In my experience, I have found that I am best placed to make decisions concerning my school				
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
31.	In my experience, I have found that centrally made policies are not always appropriate to local circumstances				
32.	Taking account of the experience of myself and other principals I know in similar situations is as important as the stated policy in making decisions about individual cases				
33.	I have had positive feedback from Directors about my decision making				
34.	The characteristics of this school community are very different from other schools I have experienced				
35.	I could not be certain about the preferences of the school community in all circumstances				
36.	Parents and community members frequently ask questions or raise concerns about policy and procedures with me				

37.	Parents and community members frequently have input into the decision-making processes about issues arising in the school				
38.	The needs of this school community are unique				
39.	My decision-making in this school is influenced by the geographical location of the school				
40.	My decision-making in this school is influenced by the cultural composition of the community				
41.	There have been instances where I have made a decision that met the general intent of a policy but where for some reason, such as in the best interest of a student(s), the detailed mandatory procedures were breached				
42.	Making decisions that involve risk is necessary to get ahead and gain promotion				
43.	Effective decision-making that meets the needs of the school and community requires principals to take responsibility for taking risks				
44.	Strategic risk-taking is essential to meet the outcomes expected of principals and schools				
45.	I never make decisions that are contrary to the regulatory framework				
46.	I feel pressured to make decisions in-line with the regulatory framework even when I don't believe it will achieve the best result				
47.	Making decisions that can be publicly and legally defended is more important than the content of the decision				

		Always	**Often**	**Occasionally**	**Never**
48.	In making decisions I refer to training/PD I have had about interpreting and applying the regulatory framework				
49.	When making decisions I try to comply with what I believe the Department would prefer me to do				

50.	I refer to the regulatory framework to assist in making decisions that achieve outcomes for students, the school and community				
51.	I use the non-mandatory information and guidelines, in addition to mandatory policy and procedures, to assist in making decisions				
52.	When making decisions I refer to past experience where I have made decisions about similar situations				
53.	When I have made decisions that were contrary to the policy and procedures in the framework I have been able to meet the outcomes I was trying to achieve				
54.	When I have made decisions that were contrary to the policy and procedures in the framework there have been repercussions from district or central office to sanction my decision				
55.	When I have made decisions that were contrary to the policy and procedures in the framework I have been disciplined or chastised by a Director regarding the decision				
56.	I seek input from the community as I have an incomplete understanding of their needs				
57.	When compliance with the framework is impossible given the local circumstances, I use professional discretion to make decisions that are contrary to stated policy or procedures				
58.	I do not comply with policies or procedures that I believe are constraining activities in my school				
59.	I refer to the regulatory framework after I have made a decision to check whether it complies with stated policies				
60.	I use professional discretion to make decisions that breach the relevant policy or procedures if they do not allow flexibility to deal with the circumstances of the particular case or issue				
61.	If the experience of myself and other principals I know in similar situations indicates a decision should be made contrary to the stated policy I will take a decision that aligns with that experience rather than the regulatory framework				

8.3 APPENDIX 3 – CONSENT FORM

Consent Form for Doctor of Business Administration Research Study

Topic: *Non-compliance by school principals: The effects of experience, stakeholder characteristics and governance mechanisms on reasoned risk-taking in decision-making*

Preliminary data collected in 2002 will be used to develop a model to explore factors impacting on reasoned risk-taking by school principals. In the context of this research risk-taking occurs when decisions are made that are not compliant with the regulatory framework, the primary governance mechanism for public schools in Western Australia. Confirmatory data will be collected through survey of a stratified random sample of principals in West Australian government schools. Survey data will be analysed and the model tested using structural equation modeling.

Investigator: Karen Trimmer

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Please indicate your agreement to participate in the study described above by signing and returning this consent form.

1. I have been informed of and understand the purposes of the study. ☐

2. I have been given an opportunity to ask questions. ☐

3. I understand I can withdraw at any time without prejudice. ☐

4. Any information which might potentially identify me will not be used in published material. ☐

5. I agree to participate in the study as outlined to me in the letter from the Investigator, Karen Trimmer, dated 26 July 2006. ☐

Name of Participant:_____

Signature:_____ Date:_____

8.4 APPENDIX 4 – FINAL QUESTIONNAIRE

Regulatory framework decision-making by principals

Thank you for taking the time to answer this survey.

This questionnaire seeks your views about the main purpose of the regulatory framework and its influence on decision-making in your school. In particular, I am interested in circumstances where you have felt a need to make decisions that do not comply with all of the policy and procedures included in the regulatory framework. For example, you may have used your professional discretion to make a decision that is not compliant with a prescribed policy or procedure, but which meets the intent or outcome you required.

While the questionnaire refers to all of the policies and procedures in the regulatory framework, it may be helpful to keep in mind commonly used policies including those pertaining to enrolments, attendance, excursions, duty of care, behaviour management and discipline and school councils, when responding to the questions.

Please be assured that your answers are strictly confidential. I will be the only person who will see your individual responses. The survey questionnaires will not be shown to or become the property of the Department of Education and Training. The published results will not identify any individual or school.

For most questions, all you need to do is tick the box which most applies to you.

Please use the reply paid envelope (it doesn't need a stamp) to return the survey to me by
31 October 2006. Your assistance and participation are greatly appreciated.

Demographic Information:

1. Your gender?

Male	Female

2. Your age range?

Up to 30	31 to 40	41 to 50	51 or over

3. Highest level of education achieved?

Bachelor	Post Grad Diploma	Masters	Doctorate

4. Do you hold the role of principal substantively?

yes	no

5. How long have you been employed in the role of principal?

Less than 1 year	1 to 2 years	>2 to 5 years	More than 5 years

6. How long have you been employed as a teacher/school administrator?

Less than 5 years	>5 to 10 years	>10 to 20 years	More than 20 years

7. District? _____

8. The location of my school is

Remote	Rural	Regional Centre	Metro

9. School Type

Primary	District High	Secondary	Agricultural College	Senior College

10. School size (number of students) _____

11. The proportion of students at this school who are of Aboriginal or Torres Strait Islander descent is _____%

12. The proportion of students at this school who are from culturally and linguistically diverse backgrounds is _____%

Regulatory Framework Decision-making

		Strongly Agree	Agree	Disagree	Strongly Disagree
13.	The principal is accountable for ensuring that decisions are made in line with the *School Education Act and Regulations* and policy included in the regulatory framework				
14.	The regulatory framework constrains me in my role of principal in making decisions that meet the needs of this school and its students				
15.	As principal, I have control over decision-making in the school				
16.	The consequences of decisions made in line with the regulatory framework are beyond my control				
17.	Principals have the authority to choose the appropriate course of action for the circumstances in their school				
18.	Authority to make decisions is delegated to principals				
19.	The main purpose of the regulatory framework is to assure compliance by schools to established policies and procedures				

20.	It is important that principals in all schools are making consistent decisions				
21.	In making decisions, I am obligated to comply with courses of action prescribed in the regulatory framework				
22.	I feel pressured to always make decisions in line with the regulatory framework				
23.	Making decisions in line with the regulatory framework ensures that they can be publicly and legally defended, regardless of the outcome of the decision				

		Strongly Agree	Agree	Disagree	Strongly Disagree
24.	The main purpose of the regulatory framework is not compliance, but to provide advice, instruction, guidance and clarification to assist with decision-making				
25.	Even if not required to do so, I would use the regulatory framework as it assists me in my role of principal to make decisions that meet the needs of this school and its students				
26.	Even if I were not required to use them, I am satisfied that the policies in the regulatory framework support the outcomes I want to achieve in this school				
27.	I have a lot of experience in making decisions as a school leader				
28.	My capacity to make decisions was a key criterion in being selected for this position as principal				
29.	I don't have a great deal of experience in making decisions as a principal				
30.	In my experience, I have found that I am best placed to make decisions concerning my school rather than relying on the regulatory framework				
31.	In my experience, I have found that centrally made policies are not always appropriate to local circumstances				
32.	Taking into account my own experiences and that of other principals in similar situations, is as important as the stated policy when making decisions about individual cases				
33.	I have had positive feedback from Directors about my decision making				
34.	The characteristics of this school community are very different from other schools I have experienced				

35.	I could not be certain about the preferences of the school community in all circumstances				
36.	Parents and community members frequently ask questions or raise concerns about policy and procedures with me				
37.	Parents and community members frequently have input into the decision-making processes regarding issues arising in the school				
38.	The needs of this school community differ from the majority of government schools				
39.	My decision-making in this school is influenced by the geographical location of the school				

		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
40.	My decision-making in this school is influenced by the cultural composition of the community				
41.	There have been instances where I have made a decision that fulfilled the general intent of a policy, but may have breached the detailed mandatory procedures				
42.	Making decisions that involve risk is necessary to get ahead and gain promotion				
43.	Effective decision-making that meets the needs of the school and community requires principals to take responsibility for taking risks				
44.	Strategic risk-taking is essential to meet the outcomes expected of principals and schools				
45.	I never make decisions that are contrary to the regulatory framework				
46.	I feel pressured to make decisions in-line with the regulatory framework even when I don't believe it will achieve the best result				
47.	I am concerned about the possibility of personal litigation if I do not comply with the policy and procedures in the regulatory framework				
48.	From the Department's perspective, making decisions that can be publicly and legally defended is more important than the content of the decision				

		Always	Often	Occasionally	Never
49.	In making decisions I refer to training/PD I have had about interpreting and applying the regulatory framework				
50.	When making decisions I consciously try to comply with what I believe the Department would prefer me to do				
51.	Even if not required to do so, I would refer to the regulatory framework to assist me in making decisions that achieve outcomes for students, the school and community				
52.	I use the non-mandatory information and guidelines, in addition to mandatory policy and procedures, to assist in making decisions				
53.	When making decisions I refer to past experience where I have made decisions about similar situations				
		Always	Often	Occasionally	Never
54.	Compliance with centralised policy in the regulatory framework constrains me from making the most appropriate decisions to meet the local needs of this school				
55.	When I have made decisions that were contrary to the policy and procedures in the framework I have been able to meet the outcomes I was trying to achieve				
56.	When I have made decisions that were contrary to the policy and procedures in the framework there have been repercussions from district or central office to sanction my decision				
57.	When I have made decisions that were contrary to the policy and procedures in the framework I have been disciplined or chastised by a Director regarding the decision				
58.	I seek input from the community as I have an incomplete understanding of their needs				
59.	When compliance with the framework is impossible given the local circumstances, I use professional discretion to make decisions that meet the outcomes required though they are contrary to stated policy or procedures				
60.	I do not comply with policies or procedures that I believe are constraining activities in my school				
61.	I refer to the regulatory framework after I have made a decision to check whether it complies with stated policies				

62.	I use professional discretion to make decisions that may breach the relevant policy or procedures if they do not allow flexibility to deal with the circumstances of the particular case or issue				
63.	If the experience of myself and other principals I know in similar situations indicates a decision should be made contrary to the stated policy I will take a decision that aligns with that experience rather than the regulatory framework				
64.	I have used professional discretion to make decisions that don't comply with stated policy or procedures on matters such as maintenance, finance and purchasing				
65.	I have used professional discretion to make decisions that don't comply with stated policy or procedures on matters related to staff such as relief, staffing, performance management and substandard performance				