



**UNIVERSITY OF SOUTHERN QUEENSLAND**



**IDENTIFYING THE CIO ROLE CONFIGURATIONS ACROSS  
THE ORGANISATIONAL LIFE CYCLE STAGES**

A Dissertation submitted by

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# ABSTRACT

Arrival of the information age has made the role of the chief information officer (CIO) as vital as other C-suite managers. Since the emergence of the CIO role in the early 1980s, much has been written about it. However, its role remains ambiguous and ill-defined. It is anticipated that one of the main reasons for the lack of clarity and the ambiguity of the CIO role is that the organisational contingencies that shape that crucial role in an organisation have not been considered. The purpose of this research is to identify the role's configuration for the chief information officer (CIO) across the organisational life cycle (OLC) stages. A quantitative study using component-based SEM was deployed to address three research questions and six hypotheses. This research takes a novel approach to investigate these questions and related hypotheses by empirically examining the relationship between a five stage model of the organisational life cycle and a configuration of six CIO roles. Data were obtained from 174 CIOs through a large scale Australia-wide survey. Findings suggest that the configurations of the CIO role differ across the five stages of the OLC. Results also revealed that CIOs tend to concentrate on the operational (or supply) side role during the early stages of the OLC, whereas a strategic (or demand) side role is predominant in the later stages and in the decline stage of the OLC. Furthermore, no significant interaction effects have been found for organisational information intensity and strategic IT vision which has been proposed to moderate the relationship between the independent variables of this study (the OLC stages) and its dependent variables (the CIO roles). The empirical findings of this study were used to develop the integrated OLC-CIO role framework that can be used to establish stage-wise thinking and improve situational awareness for modern CIOs. This research made several important contributions to existing knowledge and practice and adds substantially to our understanding regarding the role of the CIO in different stages of the OLC. Theoretically, this research has contributed to the growing body of knowledge by conducting an extensive review of the existing literature and addressing an existing gap—that is, investigating the CIO roles across different stages of the organisational life cycle.

This research provided support to the OLC and CIO role theories, validated and modified two instruments, introduced two new definitions, and applied and evaluated PLS/SEM in testing complex model competently. The integrated OLC-CIO role framework developed in this study has many useful implications for practitioners, organisations' top management, and for specialist education and training institutes responsible for preparing future CIOs. The limitations of this study are acknowledged and a number of suggestions for future research are provided that build on the theoretical and practical contributions of this study.

# CERTIFICATION OF DISSERTATION

I certify that the ideas, results, analysis, and conclusion reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award. To the best of my belief, the thesis contains no material previously published or written by another person, except where due reference is made in the thesis itself.

..... /12/2014

Moyassar Zuhair Al-Taie

Endorsement

..... /12/ 2014

Michael Lane, Principal Supervisor

..... /12/ 2014

Aileen Cater-Steel, Associate Supervisor

# CANDIDATE'S PUBLICATIONS

During the course of the research, a number of publications were published.

I was the primary author of the following co-authored publications:

Al-Taie, Moyassar, Lane, Michael and Cater-Steel, Aileen (2014) 'A past to present journey: A critical examination of the role of the chief information officer'. In: Manish Wadhwa & Alan Harper (eds.) *Technology, Innovation and Enterprise Transformation* Advances in Business Information Systems and Analytics (ABISA) series, IGI-Global, Hershey, PA, USA.

Al-Taie, Moyassar, Lane, Michael and Cater-Steel, Aileen (2013) 'The CIO Role Expectations Instrument: Validation and Model Testing', *Proceedings of the 24<sup>th</sup> Australasian Conference on Information Systems: Information Systems: Transforming the Future*, 4-6 Dec 2013, RMIT University, Melbourne, Australia.

Al-Taie, Moyassar, Lane, Michael and Cater-Steel, Aileen (2014) 'The Relationship between Organisational Strategic IT Vision and CIO Roles: One Size Does Not Fit All', *Australasian Journal of Information Systems*, vol 18, no.2, pp. 59-89. (Ranked "A" by the Australian Council of Professors and Heads of Information Systems and the Australian Business Deans' Council 'ABDC').

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## List of Abbreviations

CIO	Chief Information Officer
CEO	Chief Executives Officer
CFO	Chief Financial Officer
CTO	Chief Technology Officer
COO	Chief Operation Officer
TMT	Top Management Team
OLC	Organisational Life Cycle
IT	Information Technology
ICT	Information and Communication Technology
IS	Information Systems
SEM	Structural Equation Modelling
PLS	Partial Least Square
CBSEM	Covariance-based Structural Equation Modelling
AVE	Average Variance Extracted
CR	Composite Reliability
SPSS	Statistical Package for Social Sciences
H	Hypothesis
<i>RQ</i>	Research Question
<i>P</i>	Probability Testing for Statistical Significance
$R^2$	Coefficient of Determination
VIF	Variance Inflation Factor

# 1 INTRODUCTION

## 1.1 Chapter Introduction

The aim of this chapter is to contextualise and provide a rationale for undertaking this research. This chapter begins by presenting the background and context of the research and outlining the main themes in the CIO role literature. The next section provides definitions of the key research terminology used in this dissertation. The third section presents the research driving factors, and briefly describes the underlying justifications for this study. The main problem investigated in this study is described and discussed in section four. The objectives of this study are then outlined. Next, the methodology used in this study is described, followed by a discussion on the significance of the research. Finally, the overall structure of the dissertation is presented.

## 1.2 Background

It has long been argued in the information systems (IS) literature that two main reasons have led to evolutionary change in the role of the chief information officer (CIO) (Fisher 2003; Gupta 1991; Hodgson & Lane 2010; Karahanna & Watson 2006; Karimi, Gupta & Somers 1996a; Weiss & Adams 2010). The first reason is the ongoing and dramatic development and change in information and communication technology infrastructure as a consequence of the digital revolution. The second reason is the increasingly competitive business environment caused by the advent of globalization which has led to the use of IT as a crucial means of gaining competitive advantage.

Over the last three decades, the role of the chief information officer (CIO) has received intense scrutiny from many scholars and practitioners alike. A review of the literature revealed at least 24 distinctive areas or themes. A summary of the main themes in the CIO literature is presented in Table 1.1.

**Table 1.1 Main Themes in CIO Literature**

	<b>Theme</b>	<b>Relevant Previous CIO Studies</b>
1	Identifying the CIO role configurations	(Agarwal & Beath 2007; Cash & Pearlson 2004; Chen & Wu 2011; Chun & Mooney 2009; CSC 1996; Gottschalk 2000a; Grover, Jeong, Kettinger & Lee 1993; IBM 2009; McLean & Smits 1993; Smaltz, Sambamurthy & Agarwal 2006)
2	The evolving role of the CIO role	(Carter, Grover & Thatcher 2011; Chun & Mooney 2009; Ende 2010; Fisher 2003; Hunter 2010; Ives & Olson 1981; Karahanna & Watson 2006; Lane & Koronios 2007; Martinotti 2005; Passino Jr & Severance 1988; Ross & Feeny 1999; Stephens, Ledbetter, Mitra & Ford 1992; Takanen 2008)
3	Identifying the critical success factors (CSFs) for the CIO role	(Boyle 1994; Chari 2006; Martin 1982; Munro 1983; Poon & Wagner 2001; Rockart 1982; von Urff Kaufeld, Chari & Freeme 2009)
4	Comparative studies of two or more group of IS leaders including the CIOs or compare a CIOs views with the CEO or academics	(Al-Taie, Lane & Cater-Steel 2014; Applegate & Elam 1992; Boyle & Burbridge Jr 1991; Brown 2008; Chun & Mooney 2009; Daum, Haeberle, Lischka & Krcmar (2004); Gonzalez & McKeen 2013; Gottschalk 2000b; Gottschalk & Karlsen 2005; Johnson & Lederer 2013; Leonard 2008; Pervan 1998; Reinhard & Bigueti 2013; Weiss & Adams 2010; Weiss 2010; Wu, Chen & Chang 2007)
5	Predict the future role of the CIO	(Andrews & Carlson 1997; Benjamin, Dickinson Jr & Rockart 1985; Cash & Pearlson 2004; Earl 1996; Kakabadse & Korac-Kakabadse 2000; Maruca 2000; Mendham 2013; Rockart, Ball & Bullen 1982; Rothfeder & Driscoll 1990; Weill & Woerner 2013)
6	How CIOs allocate their time	(Applegate & Elam 1992; Couger & Amoroso 1989; Dawson & Kauffman 2010; Gottschalk 2000b; Gupta, Wilderom & van Hillegersberg 2009; Stephens 1995; Weill & Woerner 2013; Weiss & Adams 2010)
7	Suggesting ways for the CIO to add value for their organisations	(Feeny & Willcocks 1998; Leidner & Mackay 2007; Willcocks, Feeny & Olson 2006).
8	The relationship between the CIO and the CEO and other executive members	(Banker, Hu, Pavlou & Luftman 2011; Bassellier, Gagnon & Pinsonneault 2008; Feeny, Edwards & Simpson 1992; Gupta 1991; Johnson & Lederer 2010; Jones, Taylor & Spencer 1995; Karahanna & Preston 2013; Lv, Zhao, Chen & He 2013; Peppard 2010; Preston & Karahanna 2009; Preston, Karahanna & Rowe 2006; Reinhard & Bigueti 2013; Stephens 1995; Stephens & Loughman 1994)
9	CIOs' critical skills and competencies	(Allison 2010; Bassellier & I 2004; Broadbent 2013; Cohen & Dennis 2010; Hodgson & Lane 2010; Hooper & Bunker 2013; BCS 2008; Joia 2010; Lane & Koronios 2007; Mingo & Santiago 2013; Shao, Feng, Choudrie & Liu 2010; Tagliavini, Moro, Ravarini & Guimaraes 2003; Todd, McKeen & Gallupe 1995; Tufts & Jacobson 2010; Waller, Rubenstrunk & Hallenbeck 2013; Westerman & Weill 2004; Wu et al. 2007; Wu, Chen & Lin 2004)
10	Public sector CIO	(Bunker 2009; Dawson & Kauffman 2010; Hooper & Bunker 2013; Lawry, Waddell & Singh 2007)
11	CIOs' key activities	(Oblinger 2000; Sellitto 2012; Stephens 1995; Stephens et al. 1992; Tagliavini et al. 2003; Weill & Woerner 2013; Wu et al. 2007; Wu et al. 2004)



**Table 1.1 Main themes in CIO literature (continued)**

	<b>Theme</b>	<b>Relevant Previous CIO Studies</b>
12	Suggesting different types of CIOs	(Chun, Sung, Griffy-Brown & Koeppl 2014; Peppard, Edwards & Lambert 2011; Sojer, Schläger & Locher 2006; Tansley, Loughran, Edwards, Lambert & Peppard 2008; Weill & Woerner 2013).
13	The CIO influence/ impact	(Chatterjee, Richardson & Zmud 2001; Chen, Preston & Xia 2010a; Enns, Huff & Golden 2003; Enns, Huff & Higgins 2000; Enns, McFarlin & Huff 2007; Khallaf & Skantz 2011; McClure & Bertot 2000; Ranganathan & Jha 2008; Wang, Chen & Zhao 2008).
14	Developing or validating distinctive measures for the CIO role	(Al-Taie, Lane & Cater-Steel 2013; Arthur Andersen & Co 1988; Chen & Wu 2011; CSC 1996; Gottschalk 2000a; Karimi, Gupta & Somers 1996b; Smaltz et al. 2006; Wu, Chen & Sambamurthy 2008)
15	CIO effectiveness	(Brown 2009; Brown 2006; Chen & Preston 2007; Gupta et al. 2009; Iyengar 2008; Li, Ding & Wu 2012; Seddon, Walker, Reynolds & Willcocks 2008; Smaltz 1999; Smaltz et al. 2006; Wu et al. 2008)
16	The role of the CIO in some specific sectors such as higher education and healthcare sectors	(Brown 2006; Glaser & Kirby 2009; Katz, Kvavik, Penrod, Pirani, Nelson & Salaway 2004; Lineman 2006; Milliron 2008; Nicolet 2011; Smaltz 1998; Smaltz et al. 2006; Zastrocky & Schlier 2000)
17	The role of the CIO in some specific countries	(Chen & Wu 2011; Cohen & Dennis 2010; Daum et al. (2004); Enns & McDonagh 2012; Fan & Dezhi 2008; Gottschalk 2002; Joia 2010; Preston et al. 2006; Rusu, El Mekawy & Hodosi 2009; Varajão, Trigo, Bulas-Cruz & Barroso 2008; Vreuls & Joia 2011; Xiaoyang & Motohashi 2008)
18	How newly appointed CIO take charge at the early stage of their job	(Capella 2006; Gerth & Peppard 2013; Leidner & Mackay 2007)
19	CIOs' barriers and enablers	(Grant & Urbanik 2012; Kaarst-Brown 2005; Romanczuk & Pemberton 1997; Smaltz 2000; Stephens & Mitra 1995; Varajão et al. 2008)
20	Classifying CIO roles into supply side and demand side roles	(Broadbent & Kitzis 2005; Chen et al. 2010a; Mark & Monnoyer 2004; Mark & Rau 2006; Sojer et al. 2006)
21	The impact of some organisational factors on CIO role	(Al-Taie et al. 2014; Banker et al. 2011; Boyle & Burbridge Jr 1991; Brown 1993; Chen et al. 2010a; Darcy, King & Xia 1999; Earl 1996; Karimi et al. 1996b; Li & Tan 2013; Peppard et al. 2011; Weill & Woerner 2013)
22	Women CIOs	(Bensten 2000; Brown & McClure 2009; Weiss & Adams 2010)
23	CIO Turnover	(Capella 2006; Chowa 2010; CristKolder 2012; Strassman 2004; Strassmann 1996; Wilder 1992)
24	CIO as a hybrid manager	(Earls & Skyrme 1992; Meiklejohn 1990; O'Connor & Smallman 1995; Skyrme 1996; Skyrme & Earl May 1990).

Despite significant research efforts to gain a better understanding of the CIO role, uncertainty and ambiguity surrounding the CIO role is a consistent theme identified by a number of IS researchers over an extended period of time (Anderson 2007; Beatty, Arnett & Liu 2005; Boyle 1994; Cohen & Dennis 2010; Gonzalez & McKeen 2013; Hunter 2010; Kakabadse & Korac-Kakabadse 2000; Louchart 2012; Maruca 2000; Peppard et al. 2011; Rockart et al. 1982; Shen 2005). It is anticipated

that one of the main reasons for the lack of clarity and the ambiguity surrounding the CIO role is that there is a lack of empirical studies that have considered the organisational contingencies that shape this crucial role in an organisation. The existing literature tends to suggest that the role of CIO is analogous for all organisations at all times and situations—in other words ‘one size fits all’ (Peppard et al. 2011). Little attention has been paid to the organisational factors or ‘contingencies’ which affect the exact shape of managers’ (leaders’) roles (Stewart 1967,1982; Zahra & Pearce 1989; Yukl 2006) and the CIO role in particular (Broadbent & Weill 1997; Brown 1993; Chen & Preston 2007; Grover et al. 1993; Rockart et al. 1982). In order to address the current gap in the literature regarding the role of CIOs, this study considers organisational factors or ‘contingencies’ (Brown 1993; Chen & Preston 2007; Rockart et al. 1982; Zahra & Pearce 1989) through the lens of five stages of the organisational life cycle. This relationship is anticipated to affect the exact shape of the leadership (including CIOs) role, responsibilities, skill and competencies. Hence, the main purpose of this study is to investigate the relationship between the organisational life cycle stages and the CIO role.

### 1.3 Definitions of Key Terms

A variety of definitions of the terms used in this study has been suggested in the literature. This study will adopt the definitions presented below in order to provide a contextual clarification of the terminology used to ascribe key research concepts.

**The chief information officer (CIO):** The most senior executive responsible for identifying information and technology needs and then delivering services to meet those needs (Broadbent & Kitzis 2005).

**The role:** A set of expected behavior patterns attributed to someone occupying a given position in a social unit (Robbins & Judge 2013).

**The organisational life cycle theory (OLC):** A paradigm which suggests that organisations evolve through a series of distinct developmental stages as they grow in size and complexity (Hanks 1990).

**Life cycle stage:** A unique configuration of variables related to organisation context and structure (Hanks, Watson, Jansen & Chandler 1993).

## 1.4 Motivation and Justification of the Study

The motivation for this study is at two levels. Firstly, at the academic level it seems that there is a lack of empirical literature regarding the impact of organisational factors on the CIO role as explained previously in the background section. This lack of empirical literature is considered a knowledge gap that needs to be addressed in order to clarify the ambiguity surrounding the crucial role of the CIO in organisations. The majority of the contemporary literatures exploring the CIO role have addressed the CIO role from the macro level, so that researchers consider that one particular role fits all organisations regardless of their contextual differences. This study aims to investigate the CIO role configuration in different contextual situations represented by the firm's stage of growth. Therefore, the CIO role will be addressed at the micro level by this research and the results are expected to be more detailed, more beneficial, and more realistic for all stakeholders. The second level of motivation for this study is at the practice level. This study can provide some potential benefits for at least four stakeholders as follows. Practicing IT leaders can use the practical implications of the integrated OLC-CIO role framework proposed in this study to align their role with their firm's situation. This alignment is expected to lead the CIO to a more effective role, enhance their credibility, and sustain their career. Accordingly, organisations can gain more value from their investment in IT, more competitive differentiation, and longer survival. Top management can use the OLC-CIO role integrated framework proposed by this study to assist in the recruitment a suitable IT leader with the capabilities that fit with the organisation's current stage of growth. The OLC-CIO role integrated framework can also be used to appraise CIO performance and to identify the appropriate training gaps. Finally, specialist education and training providers can use the practical implication of this study to improve their programs and curriculums to prepare stagewise thinking CIOs who have the required situational awareness to oversee the valuable IT assets in organisations.

Research into the CIO role in organisations can be justified for several reasons. Firstly, the survival and the destiny of modern organisations are highly dependent on the effectiveness of the CIO position to drive transformational change in an organisation and bridge the gap between its IT operations and its strategic goals (Byrnes & Corporate 2005; Stephens 1995). Furthermore, the evolving and confusing nature of the CIO role has been recognized by a number of key studies (Beatty et al. 2005; Boyle 1994; Hunter 2010; Peppard et al. 2011; Rockart et al. 1982; Romanczuk & Pemberton 1997). This makes this topic worthwhile for PhD research. Moreover, the CIO role in modern organisations has become more important, more visible, and more relevant with the growing business dependency on ICT to create value and achieve competitive advantage. Hence, the uniqueness, the distinctiveness and the vitality of the CIO role as an important hub of organisational strategic decision-making justifies further investigation within the organisational context. Three decades ago, Benbasat, Dexter, Drury and Goldstein (1984) pointed out that ‘practitioners had long been struggling for an integrative framework to guide them in the difficult, and often unrewarding, task of managing the computer resource’ (p. 476). Unfortunately, this view still holds a high degree of currency nowadays despite the huge amount of research carried out in that regard. This study attempts to present an integrative framework that can help CIOs effectively oversee IT operations.

This research also responds to the recommendation of Davis (2013) and Gottschalk (2000b) who suggested the importance of studying the CIO role according to the organisational stages of growth. In addition, Scott and Bruce (1987) have asserted the importance of addressing the role of top management in the context of the organisational life cycle. The evolving nature of the managerial work across the organisational life cycle has been confirmed by a number of empirical studies (e.g. Chang 2009; Cowen, Middaugh & McCarthy 1984b; Huse & Zattoni 2008; Johnson 1997; Roche 2009; Smith, Mitchell & Summer 1985; Wall 1989; Zahra & Pearce 1989). This provides strong justification for the investigation of the CIO’s role in the context of the organisational life cycle. Shirokova (2009) asserted that studying different managerial aspects at different life cycle stages provides the practising manager with a powerful change management tool. Furthermore, Peppard et al. (2011) pointed out the importance of the alignment between the CIO role and the

organisational requirements, and vice versa. Varajão et al. (2008) and Smaltz et al. (2006) highlighted the dynamic nature of the CIO role and that it is dependent upon organisational contextual factors. As well, practitioners and consultants (e.g., Curran 2009; Davis 2013; PWC 2009) have emphasized the impact of organisational contingencies on the CIO role.

An extensive review of the literature relating to the CIO role revealed a handful of studies that incorporated some organisational contingencies. For example, Boyle and Burbridge Jr (1991) examined how the CIO rank and title differ according to organisation factors. They concluded that the value and importance of the CIO should be assessed not in the aggregate, but on a company-by-company basis in relation to several organisational factors. Earl (1996) identified some organisational factors that affect the CIO role in an organisation. Another study conducted by Chen et al. (2010a) found that organisational situational factors need to be considered as antecedents of CIO leadership. Recent evidence suggests that a match between business strategy and CIOs of certain repertoires of competencies, experiences and personalities could lead to better organisational performance (Li & Tan 2013). Al-Taie et al. (2014) demonstrated that the importance of the CIO role differs in accordance with the organisational IT vision. According to Peppard et al. (2011) the appropriate role for the CIO at a particular organisation at a point in time is determined by the criticality of information and technology for competitive differentiation and the maturity of an organisation's information leadership capabilities and digital literacy. It has been noticed that CIO roles are heavily moderated by the length of business cycle in which the company operates (Chun et al. 2014). Finally, Weill and Woerner (2013) identified different types of CIOs (IT services CIO, external customer CIO, embedded CIO, and enterprise process CIO) in the context of different top-performing firms.

The findings of the previously discussed literature refute the notion of 'one size fits all' as there is no optimal CIO role configuration for all situations. It is also anticipated that studying the CIO role without considering the organisational context can result in a misunderstanding of that crucial role. Clarifying the ambiguity surrounding the CIO role can result in improved role effectiveness, higher job satisfaction, higher commitment by CIOs to firms and fewer turnovers in the CIO

position in organisations. Achieving these outcomes will, in turn, increase the expected value that organisations can realise from IT investment.

## 1.5 Study Problem

The arrival of the information age has made the role of the CIO as vital as that of other C-suite managers. Since the emergence of the CIO role in the early 1980s, much has been written about it; so far, however, this role remains ambiguous and ill-defined. This ambiguity indicates a lack of theory building regarding the CIO role in organisations. This research proposes that studying the CIO role without considering the organisational factors or ‘contingencies’ which affect the exact shape of managers’ (leaders’) roles (Stewart 1967, 1982; Yukl 2006; Zahra & Pearce 1989) and the CIO role in particular (Broadbent & Weill 1997; Brown 1993; Chen & Preston 2007; Grover et al. 1993; Rockart et al. 1982) can mislead IT leaders in their attempt to create business value from the effective use of IT. An extensive review of the literature indicates that there is a lack of empirical studies which specifically examine the changing role of the CIO within the context of organisational growth stages. Therefore, this study takes a novel approach to clarify the ambiguity surrounding the CIO’s role by investigating it within the context of the organisational life cycle (OLC).

Building upon previous discussions, this study will address the following general research questions.

**RQ1:** Does the CIO role configuration differ across the stages of the OLC?

**RQ2:** What is the composition of the CIO role configuration at each stage of the OLC?

**RQ3:** Does organisational information intensity and strategic IT vision moderate the relationship between the OLC stages and the CIO roles?

## 1.6 Study Objectives

This study aims to identify CIO role configurations throughout the stages of organisational growth. Therefore, developing a contingency framework for the CIO role across the organisational life cycle stages is the main objective of this study. With this effort, this research is intended to contribute to the understanding of how organisational contingencies integrated within the OLC stages can shape the CIO role configuration. In order to achieve this objective, several milestones were specified as follows:

- 1- Review and rationally compare current CIO role configurations identified in the literature and select the most appropriate one to represent the research dependent variable.
- 2- Review and rationally compare the current OLC models identified in the literature and select the one that serves the main objective of this research as an independent variable of this research.
- 3- Review the current leadership literature in general and the CIO role literature in order to select the moderator variables that might affect the strength and/or the direction of the relationship between the OLC stages and the CIO roles.
- 4- Build the theoretical research model and formulate a set of relevant hypotheses based on the findings of the three previous steps.
- 5- Finally, collect the required data from the targeted population and then analyze this data statistically in order to test the research hypotheses incorporated within the proposed research model and answer the research questions.

## 1.7 Research Methodology

Methodologists have identified two main research paradigms in information systems (IS) field: positivism and interpretivism (Chen & Hirschheim 2004; Fitzgerald & Howcroft 1998a; Gregor 2006; Orlikowski & Baroudi 1991; Weber 2004). This study has adopted the positivist research paradigm as a foundation that drives the research flow in terms of research method, data collection method, data analysis techniques, and then limits the conclusions that can be drawn from the research results.

Building upon the positivist research paradigm, this study uses a cross sectional survey design to collect data regarding Australian CIOs and their firms in order to address the research questions and test the research hypotheses. Data for this research were collected through a large scale mail survey carried out in Australia in 2012. The survey was administrated in three waves—two waves of postal mail followed by an email survey.

From an epistemological point of view, this research—as explained earlier—has adopted a positivist paradigm, so that the structural equation modelling (SEM) statistical technique is considered an appropriate data analysis technique (Urbach & Ahlemann 2010).

## **1.8 Significance of the Study**

Throughout this dissertation, an attempt will be undertaken to develop a theoretical model to investigate the CIO role configuration in accordance with the organisational life cycle stages. The significance of this study lies in its expected contributions to theory and practice.

### **1.8.1 The expected contribution to theory and knowledge**

The expected contribution to theory and knowledge is as follows:

- a) The study addresses the current gap in the body of knowledge regarding the CIO role at different stages of the OLC by developing and testing an integrated framework to identify the configuration of CIO roles at each stage of the OLC based upon an empirical study.
- b) By conducting a comprehensive review of the literature in terms of the current OLC models and CIO role configurations it highlight gaps in the literature and suggests future studies to address these gaps.



- c) The study will provide support for or refute the CIO role and organisational life cycle theories in light of the comprehensive review of the literature and the empirical results of this study.
- d) Provide clarification on some of the ambiguity surrounding the CIO role by shedding some light on organisational contingencies (firm situation, firm structure, firm size, and firm decision making method/information processing) integrated within the OLC and the CIO role.
- e) Assess the moderation effects of two important organisational contingencies (information intensity and strategic IT vision) which are anticipated to affect the direction and/or strength of the relationship between the dependent variable of this study (the CIO roles) and the independent variable (the OLC stages).
- f) Modify and validate a more generic CIO role expectations instrument that can be used with confidence in a wide range of industries, rather than solely in the healthcare industry in which it was developed and within a different context (Australia).
- g) Validate one of the recent OLC instruments that can be used as a taxonomic tool to classify organisations into five stages of the OLC.
- h) Provided another example of how to use PLS/SEM as a contemporary method to validate instruments in two major fields: organisational theory and IS.

### **1.8.2 The expected contribution to practice**

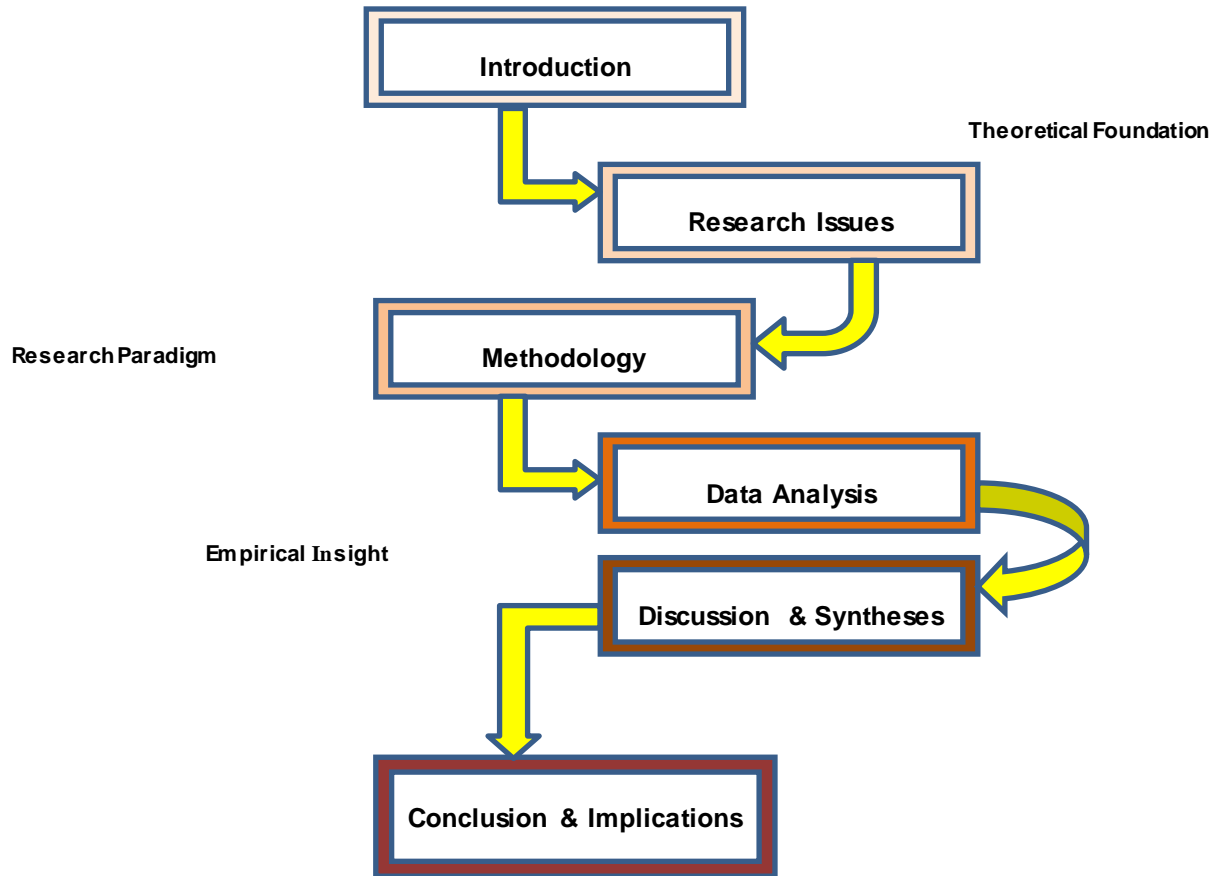
This research can contribute to practice in several ways. First, the Integrated OLC-CIO role framework proposed by this study will provide practising and training CIOs with a roadmap of effective roles and positive organisational attitudes required for a sustainable career. It will enhance the CIOs' situational awareness and their stagewise thinking. Aligning CIO roles with the current situation of the firm

represented by the growth stage of their firm might increase CIO effectiveness and, subsequently, the value created for a firm from IT. Second, this study intends to examine the validity of the previous literature that emphasized the dual domains of the modern CIO role (operational/supply roles vs. strategic/demand roles). Clarifying that issue can provide CIOs with the required skills/roles to be a value-adding IT leader. Furthermore, the Integrated OLC-CIO role framework proposed by this study will provide management with an effective tool to recruit and retain the most suitable CIO for the firm who has the right skills and the capabilities that allow them to play the required role configuration (supply) to meet the organisation's current situation (demand). The proposed framework can also be used by management to appraise the performance of the CIO by estimating the extent of the alignment of their firm's stage of growth and the required configuration of CIO roles for this stage. Moreover, the education/training programmes for specialist institutions responsible for preparing CIOs can use the results of this study to improve their programs and curriculum.

## **1.9 Dissertation Outline**

This dissertation has been divided into six inter-related chapters including the introduction. Figure 1.1 depicts the structure of this dissertation. A brief description of each of the next five chapters is given as follows. Chapter 2 begins by laying out the theoretical foundation of this study by reviewing the literature related to the organisational life cycle (OLC) and the chief information officer (CIO) role. Based on the literature reviewed in chapter 2, the research model will be developed and a set of relevant hypotheses will be formulated. The research methodology will be the topic of chapter 3, within which the research paradigm, data collection method, measures and scales, procedures, and statistical techniques will be identified and justified. The focus of chapter 4 is to present the results obtained from the analysis of the collected data in order to test the research hypotheses. In Chapter 5, the findings obtained from results presented in the previous chapter are discussed and synthesized. The last chapter (6) provides a summary of the entire dissertation in terms of its objectives and how they were achieved. Chapter 6 discusses the main contributions of this research to theory and practice, in addition to acknowledging some limitations and providing suggestions for future research.

Figure 1.1 Dissertation Outline



## **Chapter Summary**

This chapter has introduced this study by giving a background regarding the status of the CIO literature. Then, the motivation and justification for carrying out this research were supplied. Next, the problem addressed in this study was described. Then the main objectives of this study were outlined and translated into a set of research questions and a set of testable hypotheses. After that, a description of the methodology used in this study was provided. The significance of this study in terms of its contribution to theory and practice was highlighted. Finally, the structure of this dissertation was outlined and illustrated. The following chapter consists of a research issues review where the relevant literature is critically reviewed.

## 2 LITERATURE REVIEW

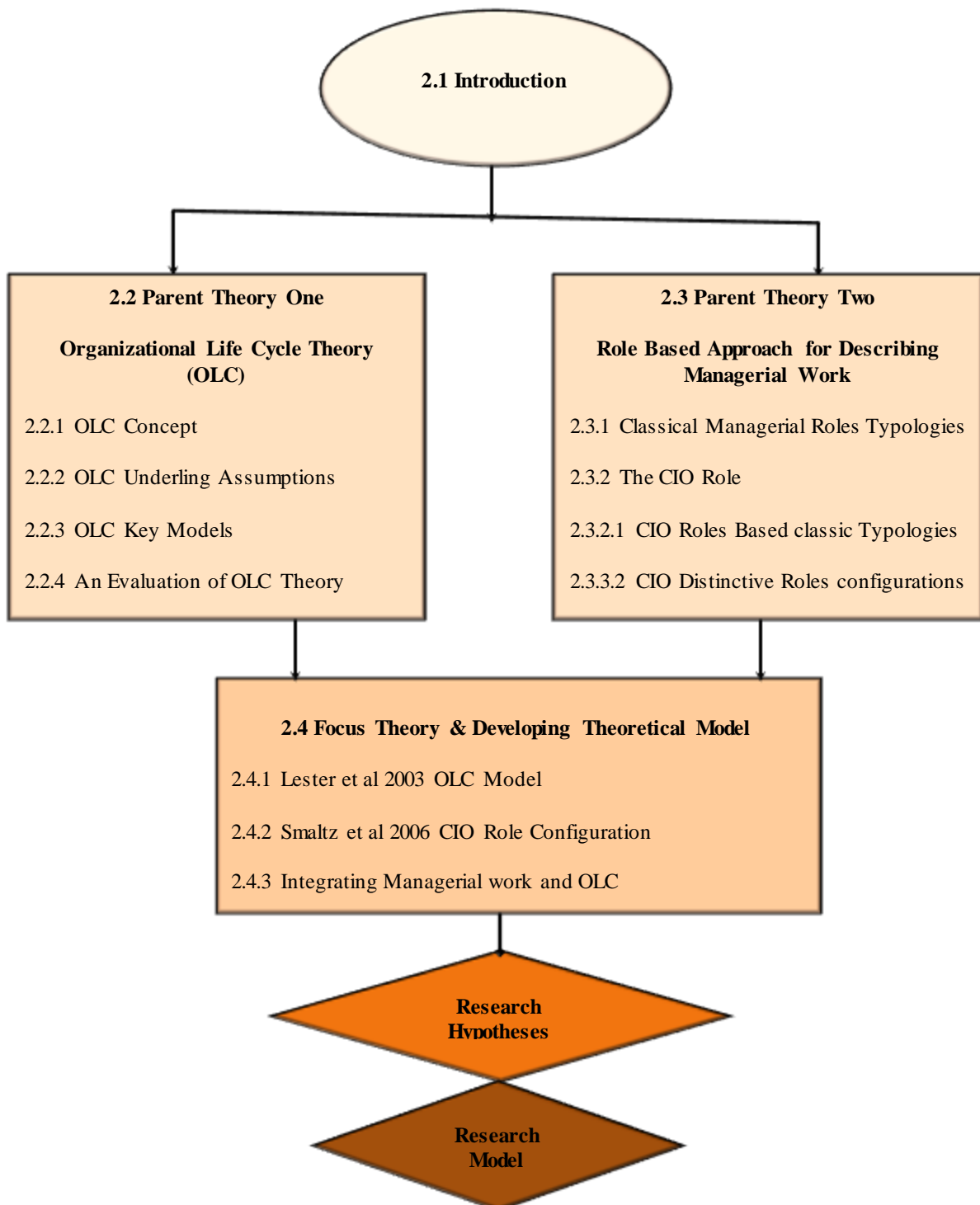
### 2.1 Introduction

In order to build the theoretical framework for ‘what is needed to be known’ in this field of research, three distinct issues will be reviewed. It is anticipated that reviewing these issues could determine the current status of the body of knowledge or ‘what is already known’ about the constructs explicit in the general research question investigated in this study.

Two main aims will be achieved by this process. Firstly, reviewing previous work might help increase the clarity on how the research gap was identified and determined to be worthy of further investigation. Furthermore, an extensive literature review will also provide readers with the theoretical foundation to help them understand the hypothesised relationships proposed in the research model.

This chapter will be organized into three main sections as depicted in Figure 2.1. The first deals with the organisational life cycle theory as a parent theory (Perry 2012) of the independent variable of this study, and the stages of the organisational life cycle (OLC). The second will review the role-based approach to describe managerial work as a second parent theory of the dependent variable of this study, the configuration of the chief information officer (CIO) role. The third will present the research problem theory (Perry 2012) by presenting the OLC model and the CIO role configuration chosen to operationalize the research constructs in this study. This section reviews the literature that integrates both the managerial work and the organisational life cycle. Finally, the previous literature will provide the basis for the set of hypotheses to be discussed as depicted in the proposed research model.

Figure 2.1 Literature Review Structure



## 2.2 Parent Theory One: The Organisational Life Cycle Theory

In this section an extensive review of the organisational life cycle (OLC) literature is conducted. The biological analogy of the life cycle has been adopted by management scholars in order to present the concept of organisational growth over time (Hanks 1990). Daft (2007) considered the organisational life cycle ‘a useful way to think about organisational growth and change’. It has been argued that the strength of the OLC model lies in its capability to acknowledge the dynamic and the evolutionary nature of organisations as they grow (Madhani 2010). Many organisational theorists have successfully tested different managerial and organisational aspects and phenomenon across the organisational life cycle stages (e.g. Cameron & Whetten 1981; Gray & Ariss 1985; Gupta & Chin 1991; Jawahar & McLaughlin 2001; Lester & Tran 2008; Mintzberg 1984). The main issues addressed in this section are: (1) the concept of the OLC, (2) the OLC main assumptions, (3) key OLC models, and (4) OLC theory evaluation.

### 2.2.1 The Concept of Organisational Life Cycle

The organisational life cycle concept is somewhat elusive (Olson & Terpstra 1993). The best way to present a comprehensive definition for the OLC is with a close examination of the previous definitions in order to select the key elements for each of them; then putting all these shared elements together to develop a comprehensive definition that gives the reader a clear meaning of the OLC. This will provide an appropriate definition of the meaning of the OLC to ensure the readers have a thorough understanding of the concept. Table 2.1 provides an exhaustive review of the key definitions that have been identified and ordered chronologically.

Closer examination of the definitions, as presented in Table 2.1, reveals some interesting observations as follows:

- ❖ The key elements of these definitions are: (1) the concept title; (2) the process description; (3) the analogy; (4) the predictability of the stages; (5) the sequence of the stages; (6) the distinct characteristics of the stages; and (7) the organisation’s mobility.

- ❖ The concept titles vary as follows: OLC Theory; OLC Model; OLC Paradigm; OLC Approach; OLC Analogy; and OLC Phenomenon.
- ❖ Scholars have described the OLC process in different ways: Organisational growth; Organisational development; Organisational change; Organisational progression.
- ❖ Scholars also described the OLC as an analogy of different things: the product life cycle; civilizations; living organisms.
- ❖ Most organisational theorists mentioned in Table 2.1 confirmed the existence of OLC stages, stage predictability, stage sequence, and distinctive characteristics of each stage.
- ❖ Within the OLC, organisations move forward or hierarchically from one point (stage) to another.

Building on these observations, this study will adopt the following definition for the OLC:

*A theory that is intended to explain the organisational growth process from creation to termination in an analogy to other living things such as living organisms, products, and civilizations. The organisations progress through a series of distinct developmental stages (each with its own characteristics) in a predictable, cumulative and sequential manner as they grow and evolve in forward movement from a premature stage toward the more mature stage.*



**Table 2.1 Summary of the Organisational Life Cycle Definitions-in chronological order**

Reference	Definition
(Penrose 1952)	Firms have a “ life cycle” analogous to that of living organisms
Toynbee 1957 in (Gray & Ariss 1985)	Organisations like civilizations are born, grow, and eventually either decline or realign.
(Galbraith 1982)	A model that captures the predictable dynamics of the stage wise development of a new organisation
(Scott & Bruce 1987)	All businesses pass through distinctive stages (each with its own characteristics) as they develop. Like products, businesses do not move through the life cycle at the same speed but unlike most products businesses can stay in the same stage for a considerable period of time.
(Hanks 1990)	A paradigm suggests that organisations evolve through a series of distinct development stages as they grow in size and complexity.
(O’Rand & Krecker 1990)	An analogy or theory-building device to characterize the passage of time and the structural change in organisations or population of organisations as processes of growth and decline
(Gupta & Chin 1991)	A model which uses a biological metaphor by assuming that a firm goes through predictable processes of inception, growth, maturity, decline and death.
(Olson & Terpstra 1993)	Organisations progress sequentially through major development stages. The life cycle stages are accompanied by predictable changes in the structure and the managerial systems of organisations
(Gupta & Chin 1994)	Organisation goes through inception to growth, maturity and decline or redevelopment
(Van De Ven & Poole 1995)	According to OLC theory, change is imminent: that is, the developing entity has within it an underlying form, logic, program, or code that regulates the process of change and moves the entity from a given point of departure toward a subsequent end that is prefigured in the present state.
(Koberg, Uhlenbruck & Sarason 1996)	OLC model is used to explain changes in a firm over time.
(Aldrich 1999)	Life cycle model , in which organisational change proceeds in stages during which organisational members must solve new problems
Bhide 2000 in (Levie & Lichtenstein 2008)	As humans pass through similar stages of physiological and psychological development from infancy to adulthood, so businesses evolve in predictable ways and encounter similar problems in their growth
(Rutherford, Buller & McMullen 2003)	Firms progress through various stages over time. OLC models typically reflect a sequential progression through a number of stages
(Frielinghaus, Mostert & Firer 2005)	Firms – in a similar fashion to living organisms- progress through a set of life stages that starts at birth and ends in death.
(Lester & Parnell 2006)	Organisation growth and development is similar to the growth and development of a living organism.

**Table 2.1 Summary of the Organisational Life Cycle Definitions-in chronological order (continued)**

Reference	Definition
Jones 2004 in (Pundziene, Kundrotas & Lydeka 2006)	A sequence of stages of growth and development through which organisations may pass
(Daft 2007)	Organisations are born, grow older, and eventual die. Organisation structure, leadership style, and administrative systems follow a fairly predictable pattern through stages in the life cycle. Stages are sequential and follow a natural progression.
(Zheng, Qu & Yang 2009)	OLC theory proposes that change in an organisation follows a sequence of progression, from the premature or homogenous to the more mature and differentiated.
(Madhani 2010)	Organisations, like all living organisms, have a well-defined life cycle and undergo very predictable and repetitive patterns of behaviour as they grow and develop.
(Chupp 2010)	Organisations follow a typical path to maturity.
(Owen & Yawson 2010)	Firms will inevitably evolve and transit from one stage of development to another. Firms will follow a predictable pattern characterized by different stages of development which cannot be easily reversed. Firms in different life cycle stages will have different sets of organisational structures, strategies and activities
(Farouk & Saleh 2011)	The firm progresses through different stages
( <i>Encyclopedia of Business</i> 2012)	Over a course of time , business firms move through a fairly predictable sequence of developmental stages
(Bayers 2011)	The organisational life cycle is the advancement of stages or phases of any organisation from its creation to its termination .

Source: Developed for this study

## 2.2.2 Underlying Assumptions of Organisational Life Cycle Theory

The underlying assumptions of the organisational life cycle (OLC) theory mentioned in previous literature can be classified into two main categories. The first includes the assumptions that describe the nature of organisational growth in general, while the second contains the description of the stages of organisational growth. The next subsections describe these two categories of the underlying assumptions of OLC theory.

### 2.2.2.1 The process of organisational growth

The following assumptions describe the process of organisational growth:

- ❖ Organisations grow as living organisms (Frielinghaus et al. 2005; Lester & Parnell 2006), or civilisation (Toynbee 1957 as cited in Gray & Ariss 1985), or products (Scott & Bruce 1987).
- ❖ Change (growth or development) in organisations is predetermined and thus predictable, and can be characterised by a number of developmental stages (Dodge & Robbins 1992; Quinn & Cameron 1983; Scott 1971; Van De Ven & Poole 1995).
- ❖ Organisations do not move from one stage to another at the same speed (Scott & Bruce 1987). This speed is closely related to the market environment of its industry (Greiner 1972).
- ❖ Organisations develop according to prefigured rules that progress from a latent or ‘primitive state’ to one that is ‘progressively more realized, mature, and differentiated’ (Levie & Lichtenstein 2008; Van De Ven & Poole 1995).
- ❖ Organisation progression is best described as hierarchical (Lavoie & Culbert 1978; Quinn & Cameron 1983) or linear or forward (Greiner 1972; Miller & Friesen 1984)—which all refer to one directional movement that is not easily reversed.
- ❖ Organisations will not go through the stages in the same sequence, as some stages could be skipped forward to a later stage.
- ❖ Organisations could regress from one stage back to a prior stage.

### **2.2.2.2 The nature of the OLC stages**

The following assumptions describe the nature of the OLC stages:

- ❖ The OLC stages are sequential (Lavoie & Culbert 1978; Quinn & Cameron 1983).
- ❖ The OLC stages are predictable, distinguishable, identifiable, and pre-determined (Galbraith 1982; Perenyi, Selvarajah & Muthaly 2011a).
- ❖ The OLC stages involve a broad range of different contextual and organisational activities, characteristics and structures (Hanks 1990; Lavoie & Culbert 1978; Lester & Parnell 2008a; Quinn & Cameron 1983).
- ❖ Each stage is a result of the previous one and a cause for the next stage (Greiner 1972).
- ❖ Each stage has no prescribed lengths of time as some firms may move through it rapidly while for others it could last for centuries or a considerable period of time (Greiner 1972; Lester, Parnell & Carraher 2003; Lippitt & Schmidt 1967; Scott & Bruce 1987).

The above assumptions prove that organisations are dynamic not static, thus the CIO roles configuration should be assessed not in the aggregate, but on an organisation-by-organisation basis in accordance to several organisational factors integrated with the stages of the OLC.

### **2.2.3 The OLC Key Models**

Many multi-stage models have been developed for organisational growth and development whether based on conceptual or empirical analysis. Following some studies which conducted a comprehensive review of the OLC models (Baird & Meshoulam 1988; Hanks 1990; Lichtenstein, Levie & Hay 2007; Phelps, Adams & Bessant 2007; Quinn & Cameron 1983) this study will summarize and present the key OLC models since the 1960s. Table 2.2 provides a comprehensive summary of 38 key OLC models.

Although all OLC models share the same assumptions discussed earlier, some differences emerge from synthesizing the OLC models, as shown in Table 2.2. In terms of the way that these models have developed throughout the last fifty years, we can say that OLC models have developed conceptually (N = 21) and empirically (N = 17). The early developed models across the 1960s-1970s are mostly conceptual, while the vast majority of the empirical ones have appeared in the last three decades. The lowest number of stages included in these models is three and the highest is ten; while the most common number is either four stages (N = 14) or five (N = 13). Thirteen models can be described as birth-to-grave models as they include the decline stage, whereas the others have described only the life stages. Only three models considered the pre start-up stage (Allen 2006; Beverland & Lockshin 2001; Torbert 1974). The first four stages of OLC models that included decline stage (e.g. Hanks et al. 1993; Hanks 1990; Lester et al. 2003; Miller & Friesen 1984; Ward 2003) are identical to the stages of the models that have four stages omitted the decline stage. Longest stage models tend to break down general stages into much more specific time periods, while shorter models tend to merge two or more developmental stages for the sake of parsimony (Lester et al. 2003). Organisational theorists have labelled OLC stages with different names, however, they all reflect the gradual growth of organisations. Also, the organisational theorists of the empirical models have used different methodologies such as quantitative (survey; simulation) and qualitative (case study; comparative analysis; historical analysis; interviews; longitudinal; focus groups) and mixed methodology. Furthermore, scholars used different methods to classify organisations into OLC stages (cluster analysis; participant self-categorisation of their firms; and authors' self-classification based on the firms' histories or secondary data) respectively. As far as the targeted type of the organisations is concerned, nearly half of the models are general (N=18) while the rest have targeted different types of firms (Small firms N = 8; High technology firms N = 5; SMEs N = 2; large firms N = 1; and family firms N = 1).

Synthesizing previous OLC models, the researcher determined that there has been strong theoretical support (e.g. Baird & Meshoulam 1988; Greiner 1972) and empirical support (e.g. Drazin & Kazanjian 1990; Hanks et al. 1993; Hanks 1990; Kazanjian 1988; Lester et al. 2003; Miller & Friesen 1984) for either four or five

stage models. In the interest of parsimony and ease of comparison this study chose a five stage model.

**Table 2.2 The Organisational Life Cycle Key Models- in chronological order**

	Reference	Type	No. of stages	Methodology	Model Type
1	(Chandler 1962)	Empirical	4	Case studies + Comparative Analysis	Large Organisations
2	(Lippitt & Schmidt 1967)	Conceptual	3	Conceptual Model	General
3	(Steinmetz 1969)	Conceptual	4	Conceptual	Small Business
4	(Scott 1971)	Conceptual	3	Conceptual	General
5	(Greiner 1972)	Conceptual	5	Conceptual Model	General
6	(Torbert 1974)	Empirical	9	Case Studies	General
7	(Adizes 1979)	Conceptual	10	Conceptual Model	General
8	(Galbraith 1982)	Conceptual	5	Conceptual	High Technology Venture
9	(Quinn & Cameron 1983)	Conceptual	4	Conceptual Integrated Model	General
10	(Churchill & Lewis 1983)	Empirical	5	Quantitative - Survey	Small Business
11	(Miller & Friesen 1984)	Empirical	5	Longitudinal study/ Classify the firms into the OLC stage through certain numeric and descriptive criteria based on the constructed histories of 36 case studies and the information were verified using questionnaires sent to senior executives.	General
12	(Mintzberg 1984)	Conceptual	4	Conceptual	General
13	(Smith et al. 1985)	Empirical	3	Field study based on questionnaires and simulation. Cluster Analysis utilized to classify the organisations.	General
14	(Gray & Ariss 1985)	Conceptual	3	Conceptual	General
15	(Scott & Bruce 1987)	Conceptual	5	Conceptual	Small Business
16	(Baird & Meshoulam 1988)	Conceptual	5	Conceptual	General
17	(Kazanjian 1988)	Empirical	4	Histories + Interviews. The first to use self-categorization approach to classify the firms into the OLC stages	Technology –based new venture (TBNVs)
18	(Baliga & Hunt 1988)	Conceptual	4	-	General
19	(Hanks 1990)	Empirical	5	Mailed Questionnaires/ Exploratory cluster analysis has been used to classify the firms into the OLC stages	High technology organisations
20	(Dodge & Robbins 1992)	Empirical	4	Secondary data on small business. The classification of organisation into the OLC stages conducted under the self-judgment of the authors and selected academics.	Small Firms
21	(Hanks et al. 1993)	Empirical	5	Mailed Questionnaires/ Exploratory cluster analysis has been used to classify the firms into the OLC stages + MANOVA	High technology organisations
22	(Thompson 1994)	Conceptual	5	-	General
23	(Hanks & Chandler 1994)	Empirical	4	Mailed Questionnaires/ Exploratory cluster analysis has been used to classify the firms into the OLC stages + chi-square	Emerging high technology organisations

**Table 2.2 The Organisational Life Cycle Key Models- in chronological order (continued)**

24	(Gupta & Chin 1994)	Conceptual	3	Conceptual Contingency Model	General
25	(Eggers, Leahy & Churchill 1994)	Empirical	6	Questionnaire + Focus groups. Firms classified into the OLC stages based on self-categorization.	Small Business
26	(Flamholtz 1995)	Conceptual	7	Conceptual	General
27	Ferreira 1997 as cited in (Ferreira, Azevedo & Cruz 2011)	Conceptual	5	Conceptual Integrated Model	SMEs
28	(Beverland & Lockshin 2001)	Empirical	4	Multiple case study and interviews	Small Wineries
29	(Jawahar & McLaughlin 2001)	Conceptual	4	Conceptual	General
30	(Lester et al. 2003)	Empirical	5	Questionnaires / Cluster analysis + ANOVA were utilized to classify the firms into OLC stages.	General
31	(Ward 2003)	Conceptual	5	Conceptual	General
32	(Hoy 2006)	Conceptual	4	conceptual	Family firms
33	(Masurel & van Montfort 2006)	Empirical	4	Questionnaires / Self-categorization item was utilized to classify the firms into the OLC stages validated by numeric criteria about the firm's age and size + Logit model	Small professional service firms
34	(Allen 2006)	Conceptual	5	Conceptual	General
35	(Stam 2009)	Empirical	5	Comparative case studies	Young fast growing firms
36	(Garengo & Bernardi 2007)	Empirical	4	(Retrospective approach) Survey & data collected during previous research program.	SMEs
37	(Teeter, R. A. & Whelan-Berry, K. S. 2008)	Empirical	3	Longitudinal study for standard case based on the observation of the second author, who was hired as a senior manager then as a senior partner for the studied firm.	Small professional service firms
38	(Jones 2009)	Conceptual	4	Conceptual	SMEs

Source: Developed for this study



After a rational comparison of the empirical five stage OLC models included in Table 2.2, this study adopted the five stage OLC model developed by Lester et al. (2003). The main features of this model, along with justification for choosing this five stage OLC model, will be provided later in the focus theory section.

### **2.2.4 Evaluation of the OLC Theory**

The organisational life cycle theory has received criticism from some researchers (e.g. Levie & Lichtenstein 2008; Levie & Lichtenstein 2010; Lichtenstein et al. 2007; McMahon 1998; O'Farrell & Hitchens 1988; Penrose 1952; Phelps et al. 2007; Stubbart & Smalley 1999) regarding the linearity of a firm's growth, the stage sequence, the descriptive nature of its foundation and so forth. However, this theory still has a high rate of currency among scholars and practitioners for several reasons. Firstly, its applicability has been empirically confirmed by a large number of researchers throughout the last three decades within different contexts (e.g. Dodge & Robbins 1992; Eggers et al. 1994; Gupta & Chin 1991; Hanks et al. 1993; Hanks 1990; Kiriri 2002; Lester et al. 2003; Masurel & van Montfort 2006; Miller & Friesen 1984; Moores & Yuen 2001; Perenyi, Selvarajah & Muthaly 2011b; Perenyi et al. 2011a; Shirokova 2009; Smith et al. 1985; Yazdanfar, Salman & Arnesson 2012). Secondly, the face validity of OLC theory has been confirmed (by Eggers et al. (1994); and Massey, Lewis, Warriner, Harris, Tweed, Cheyne and Cameron (2006) as all of the executives/owners of the firms that participated in these two studies found that the notion of the OLC was meaningful and they were able to unambiguously categorize their firms in one of the OLC stages. Furthermore, many organisational theorists have confirmed the OLC theory as:

- ❖ an important tool which provides management with invaluable information that can utilized for long range planning and guide the firm's strategic direction (Frielinghaus et al. 2005; Scott & Bruce 1987); understanding the organisation at the macro level of analysis (Olson & Terpstra 1993); foreseeing the problems that the firm will face as it grows over time and then prescribing effective organisational treatment, therapy and surgery accordingly to move an organisation to the next stage (Adizes 1979; Daft 2007);

- ❖ a road map that could help identify critical organisational transitions as well as pitfalls the organisation should seek to avoid as it grows in size and complexity (Hanks 1990);
- ❖ a timetable for adding levels of management, formalizing organisation procedures and systems, revising organisational priorities, and knowing when to let go of cherished past strategies and practices that will only hinder future growth (Hanks et al. 1993).

Moreover, the stages approach has been widely and successfully adopted by a large number of researchers from different managerial arenas. Table 2.3 presents scholarly literature from different managerial fields that have applied the OLC theory.

**Table 2.3 Scholarly literature from different fields that have applied OLC theory**

	<b>Field(s)</b>	<b>Reference(s)</b>
1	Information Systems	(Garengo, Nudurupati & Bititci 2007; Gupta & Chin 1991; Lester & Tran 2008; Lester, Tran & Carraher 2011; Moores, Mula & Yuen 1993; Reddy & Reddy 2002)
2	Human Resources Management	(Baird & Meshoulam 1988; Chen & Hsieh 2005; Chen & Kuo 2004; Liao 2007; Rutherford et al. 2003; Yao-Sheng 2006)
3	Organisational Behaviour	(Gray & Ariss 1985; Gupta & Chin 1993; Hassan, Shah, Khan, Ikramullah & Zaman 2011; Koberg et al. 1996; Lester & Parnell 2008a; Zheng et al. 2009),
4	Marketing	(Ferreira, Leitão & Garrido Azevedo 2007; Madhani 2010)
5	Accounting & Finance	(Auzair & Langfield-Smith 2005; Balkin & Montemayor 2000; Bulan & Yan 2009; Frielinghaus et al. 2005; Kallunki & Silvola 2008; Moores & Yuen 2001; Owen & Yawson 2010; Silvola 2008)

Following Roche (2009), the purpose of this study is not to prove or disprove the existence of the organisational life cycle or to examine how CIOs contribute to manage the transition from one stage of the OLC to another. The main aim of this study is to explore how the roles of the CIO differ across the organisational life cycle stages and to identify the CIO roles configuration at each stage of the OLC. OLC theory will be utilized in the same manner as Rumelt (1979) who used the product

life cycle (PLC) as a ‘frame theory’, which allows the identification of the important from non-important roles of CIOs in each stage of the OLC. It is believed that the OLC model is the best tool to help CIOs understand and fit their role to the organisational current situation represented by the OLC stages. In addition, it could help to clarify the ambiguity surrounding the CIO role. The OLC-CIO role framework investigated in this study will provide CIOs with a roadmap for determining their required roles (supply) that matches with their organisations’ situation (demand). A good match between the CIO roles and the organisational situation will help CIOs to achieve a sustainable career within their organisation on one hand and help their organisation to smoothly transit to the next stage of growth on the other hand. This OLC-CIO role framework will also provide senior management with insight to recruit and select the most suitable CIO to perform the role (supply) in a way that fits with the organisation’s current situation (demand).

## **2.3 Parent Theory Two: Manager’s Work: A Role Based Approach**

For decades, managers’ behaviour has been a central issue for both practitioners and academics. It is recognized that there are five major approaches to describe managerial work. The first was the functional approach which suggested a certain set of distinctive functions required from the managers to do their job in an effective and efficient manner (Fayol 1916; Gulick & Urwick 1937; Mahoney, Jerdee & Carroll 1965). The second was the time management approach which focused on addressing the question of how managers allocate their time (Carlson 1951; Martinko 1985; Mintzberg 1968, 1971, 1973; Stewart 1967). The concern of the third approach was the types of skills or competencies every successful manager must have to perform his job (Boyatzis 1982; Katz 1974). A fourth stream of empirical studies has attempted to describe the actual work of managers through their job activities or tasks (Kotter 1982; Luthans, Rosenkrantz & Hennessey 1985; Luthans, Welsh & Rosenkrantz 1993); whereas the fifth approach attempted to capture the manager’s work through the roles played in their job (Adizes 1976, 2004; Hart & Quinn 1993; Mintzberg 1973; Quinn & Cameron 1983; Quinn, Faerman, Thompson, McGrath & Clair 2006; Quinn & Rohrbaugh 1981; Quinn & Cameron 1988). As this study will

adopt the role-based approach for describing the CIO role in Australian organisations, the next section will review the main classical roles-based typologies mentioned in prior literature.

### **2.3.1 Classical Managerial Roles Typologies**

The role based approach has been identified as an effective way to capture all managers' behaviours. The role based approach has adopted the definition of Sarbin and Allen (1968) for the managerial role as 'an organized set of behaviours belonging to an identifiable office or position'—which is close to one of the recent definitions presented by Robbins and Judge (2013) who looked to the role as 'a set of expected behaviour patterns attributed to someone occupying a given position in a social unit'. An extensive review of literature related to managerial work has resulted in four typologies that shaped the manager's role from the classical point of view so far. A review of each of these four typologies is presented as follows:

#### **2.3.1.1 Mintzberg's management roles**

The first and foremost typology of the management roles was developed by the Canadian academic Henry Mintzberg (Mintzberg 1968, 1971, 1973, 1988). During the period 1966-1968, Mintzberg conducted doctoral research based on structural observation of five chief executives from different industries for a one week period each. The aim of Mintzberg's dissertation was to develop a set of words that firstly described accurately what managers do and, secondly, replace Fayol's classic function-based typology. Mintzberg justified his claim by criticising Fayol's typology of classic functions of managers. From Mintzberg's point of view, Fayol's five key functions (planning, organizing, controlling, commanding, and coordinating) does not describe the actual work of managers at all. Rather, Fayol's functions-based typology describes certain vague objectives of managerial work (Mintzberg 1971) and represents managerial folklore (Mintzberg 1975). Conversely, Mintzberg presented ten managerial roles that best describe the basic and the actual content of managerial work. He grouped these ten roles in three major groups as follows: Interpersonal roles (figurehead, leader, liaison), Informational roles (monitor, disseminator, spokesman), and Decisional roles (entrepreneur, disturbance handler, resource allocator, negotiator). Brief descriptions of each of the ten roles of

Mintzberg's managerial roles typology are provided in Table 2.4. According to Mintzberg, these roles should be performed together as a gestalt (integrated whole), so none of these roles can be ignored or taken out of the model or addressed separately (Mintzberg 1973). These roles are relevant to all types of managers regardless of the nature of their firm, their managerial level or functional areas they work within. However, the relative importance of these roles will vary among managers based on the situation (e.g., organisation type, managerial level, functional area).

**Table 2.4 Mintzberg's Ten Managerial Roles**

Group	Roles involved	Roles definition
Interpersonal roles	Figurehead	Symbolic head; obliged to perform a number of routine duties of a legal or social nature.
	Leader	Responsible for the motivation and activation of subordinates; responsible for staffing, training, and associated duties.
	Liaison	Maintains self-developed network of outside contact and informers who provide favours and information
Informational roles	Monitor	Seeks and receives wide variety of specific information (much of it current) to develop through understanding of organisation and environment; emerges as nerve centre of internal and external information about the organisation.
	Disseminator	Transmits information received from outsiders or from other subordinates to members of the organisation. Some information is factual, some involves interpretation and integration of diverse value positions of organisational influencers.
	Spokesperson	Transmits information to outsiders on organisation's plan, policies, actions, results etc.; serves as expert on organisation's industry.
Decisional roles	Entrepreneur	Searches organisation and its environment for opportunities and initiates' improvement projects to bring about change; supervises design of certain projects as well.
	Disturbance handler	Responsible for corrective action when organisation faces important, unexpected disturbances
	Resource allocator	Responsible for the allocation of organisational resources of all kinds - in effect, the making or approval of all significant organisational decisions
	Negotiator	Responsible for representing the organisation at major negotiations.

Source: (Mintzberg 1973)

Three groups of authors have tried to operationalize the Mintzberg managerial roles typology by developing an instrument to identify the relative importance of the proposed ten roles. First, McCall and Segrist (1980) proposed and validated a multi-item questionnaire that is known by the name of the managerial work survey (MWS). Second, Lau, Newman and Broedling (1980) presented a multi-item instrument based on Mintzberg's managerial roles typology. A third instrument was developed by Mount and Bartlett (1999) known as the managerial role assessment (MRAS) and was based on a single item for each role. Since the validity and the reliability of the first (MWS) instrument are well-established, it has received high acceptance among researchers in comparison to the second and third instruments. The MWS instrument has been widely used to date to empirically identify the perceived importance of the managerial role of different types of managers including CIOs.

Some follow-up studies have supported Mintzberg's managerial roles typology and the propositions associated with it (Kurke & Aldrich 1983; Lau & Pavett 1980; Paolillo 1981; Paolillo 1987; Pavett & Lau 1983, 1985; Tengblad 2006; Zabid 1987). For example, Mintzberg's work regarding managerial roles has passed the test of time according to some studies that examined the validity of his work after ten years (Kurke & Aldrich 1983) or even after 30 years (Tengblad 2006). Other studies have confirmed that the Mintzberg managerial roles typology fits all types of managers regardless of their sector (Lau et al. 1980; Pavett & Lau 1985); their functional area (Paolillo 1987; Pavett & Lau 1983; Zabid 1987); their hierarchical level (Paolillo 1981; Pavett & Lau 1983; Zabid 1987); or their firm size (Zabid 1987). Furthermore, Mintzberg's managerial roles typology has been found to be valid worldwide, as well as in different cultural environments (countries) such as Sweden (Tengblad 2006), China (Shenkar, Ronen, Shefy & Chow 1998), Malaysia (Zabid 1987), Thailand (Chareanpunsirikul & Wood 2002) and Israel (Shapira & Dunbar 1980)—in addition to the USA where this typology was initially developed.

Despite this support, Mintzberg's typology of managerial roles has been criticized and refined by other groups of scholars due to some weaknesses discovered in this typology. In terms of sample size, some researchers (e.g. Chareanpunsirikul & Wood 2002; Luthans et al. 1985; McCall & Segrist 1980) argued that Mintzberg's

managerial roles typology suffers from a lack of generalizability due to it being developed from a very small sample size of top executive managers. Another group (such as Carroll & Gillen 1987; Martinko 1985; Willmott 1987) has criticized the methodology used by Mintzberg. These studies assert that the observation of specific types of top managers (CEOs) cannot help to capture the mental, physical and institutional dimensions of the real work of managers. Moreover, processing real data of a questionnaire based on Mintzberg's managerial roles typology using different statistical techniques such as factor analysis (Lau et al. 1980; McCall & Segrist 1980; Morse & Wagner 1978) in-basket simulation (Shapira & Dunbar 1980) and spatial distribution (Shenkar et al. 1998) has identified some problems regarding the dimensionality, the overlap, and the cross loadings of the ten roles involved in the Mintzberg framework that affects its validity.

### **2.3.1.2 Adezis's typology (PAEI) model**

Based on his experience in different types of firms in different countries, Ichak Adezis (Adizes 1976, 1979, 1980, 2004) identified four basic roles for the manager that, if performed altogether, will lead to effective management of the firm in the short and long range. In the absence of these basic roles, a style of mismanagement could occur. These roles were Producer, Administrator, Entrepreneur, and Integrator (PAEI). Table 2.5 provides a description of each of these four roles. Adezis considered these four roles as vitamins for the body of the organisation, so that if any of these are missing this will result in a disease—a 'mismanagement style' that affects an organisation's health and its 'effectiveness and efficiency'. Mismanagement style resulting from the absence of any of these four roles will dramatically change, where the producer role will become 'the loner', the administrator will become 'the bureaucratic', the entrepreneur will become 'the crisis maker', and the integrator will become 'the superfollower'. Adezis (1979) concluded that managers who fulfil all of these four roles in an excellent manner are extremely rare.

It is worth mentioning that Adizes (1979) has conceptually tried to identify the PAEI roles combination 'configuration' across his model of the organisational life cycle

that includes ten specific stages of growth that are explained later in this chapter. This approach closely resembles the main aim of this study which seeks also to identify empirically the configuration of the CIO roles within each of the stages of the organisational life cycle.

**Table 2.5 Adizes’s Manager Roles Typology (PAEI)**

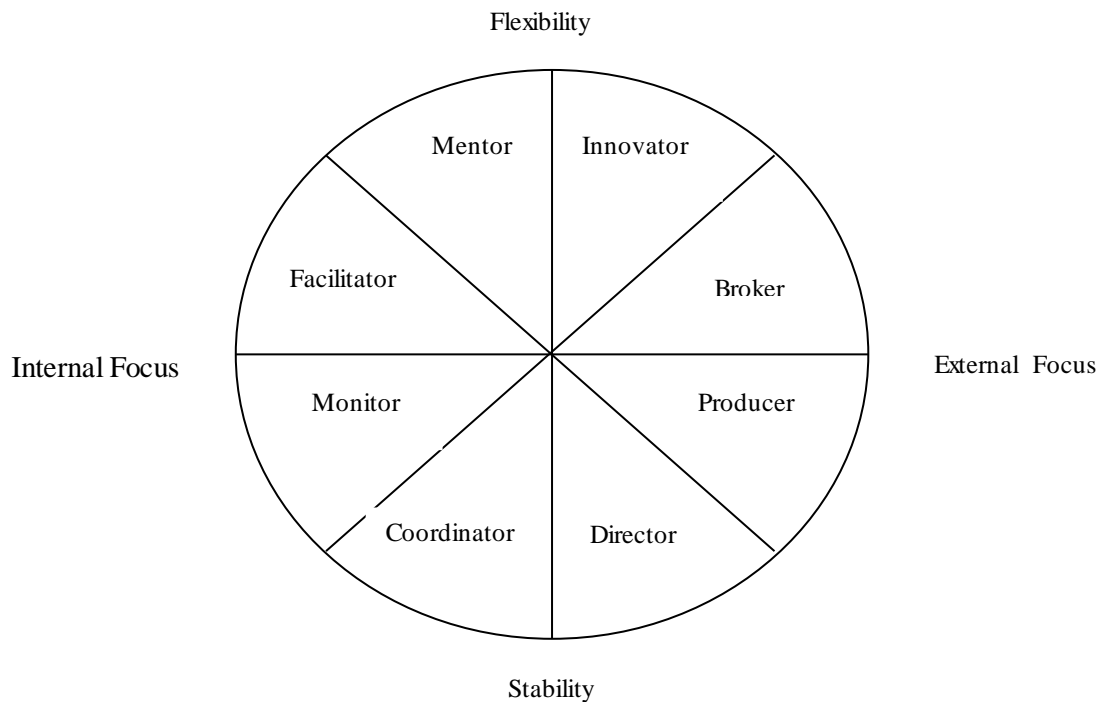
Role	Definition
Producer	Produce results to achieve the organisation effectiveness in the short run
Administrator	Make sure that the organisation does the right thing in the right sequence with the right intensity. Pay attention to details to make the organisation efficient in the short run.
Entrepreneur	A visionary who can foresee the direction the organisation is going to take through combined creativity with the willingness to take risks. This makes the organisation effective in the long run.
Integrator	Build a climate and systems of values that will motivate individuals in the organisation to work together. This will produce efficiency in the long run.

Source: Adizes (1976)

### 2.3.1.3 Quinn and associate (CVF) typology

The competing value framework (CVF) developed by Quinn (1988); Quinn and Rohrbaugh (1981); Quinn and Rohrbaugh (1983); and Quinn et al. (2006) has evolved into eight managerial roles that help to evaluate managers’ effectiveness in different organisational situations. These roles have been created initially from four quadrants produced by putting the two dimensions of the effective management flexibility/stability dimension on the vertical axis and the internal/external dimension on the horizontal axis. Figure 2.2 illustrates the CVF.



**Figure 2.2 The Competing Value Framework (CVF)**

Source: Quinn (1988)

Each of these four quadrants represent a particular organisational demand ‘situation’ that requires a particular managerial role that the manager should play in order to tackle this demand in an effective fashion. As can be seen from Figure 2.2 the identified roles based on the CVF are: Mentor, Facilitator, Innovator, Broker, Monitor, Coordinator, Producer, and Director. A brief description of each of these roles is provided in Table 2.6.

**Table 2.6 The CVF Manager's Roles**

Quadrant	Roles Involved	Role Definition
Flexibility - Internal focus	Mentor	Develops staff, listens empathically, and treats each staff member in a caring way.
	Facilitator	Builds teams, facilitates consensus, managing conflict.
Flexibility - External focus	Innovator	Continually searches for innovation and improvements, solves problems in a creative way, and envisions needed change.
	Broker	Exerts upward influence, acquires needed resources, external focus.
Stability - Internal focus	Monitor	Monitors progress, collect information, holds regular reviews.
	Coordinator	Coordinates activities, schedules, brings sense of order to workplace.
Stability -External focus	Producer	Gets the work done, customer focus, achievement orientation
	Director	Provides direction, clarifies priorities, communicates unit's goals.

Source: (Quinn et al. 2006)

A ninth role has been added by Vilkinas and Cartan (2001,2006) as an integrator positioned in the middle of the CVF to create the integrated competing value framework (ICVF). The integrator role requires the manager to 'read' the environment and determine which of the eight roles should be adopted in light of the environmental scanning.

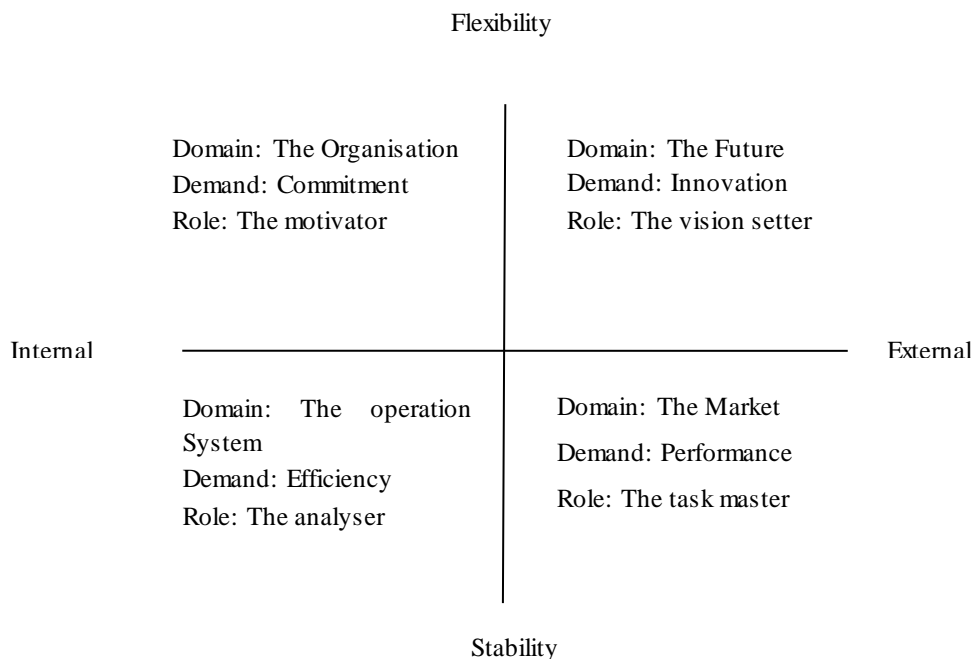
Although the CVF is basically a conceptual model, it has been empirically tested by a number of studies (e.g. Buenger, Daft, Conlon & Austin 1996; Denison, Hooijberg & Quinn 1995; Howard 1998 as reported in Vilkinas and Cartan 2006). These studies all supported the architecture of the CVF. However, some factor analytic studies of questionnaire-based CVFs such as Hooijberg & Choi (2000) have reported high overlap among three roles (producer, director, and coordinator), therefore, they suggested six rather than eight roles for the CVF.

The focal idea for the CVF supports the view of this study as it suggests that the manager's role differs according to the organisational demand 'situation'. This indicates that the CIO roles might also differ according to the different organisational demands presented by the OLC stages.

#### 2.3.1.4 Hart and Quinn (1993) typology

Building on the CVF roles typology and previous literature relating to top management/leadership, Hart and Quinn (1993) proposed the integrated model of executive leadership roles. The two axes of the CVF mentioned previously were the basis of this model. Each of the four quadrants created by these two axes represent a domain of action entailing a particular demand that requires a specific role by the top manager. Figure 2.3 shows the integrated model of executive leadership roles.

**Figure 2.3 The Integrated Model of Executive Leadership Roles**



Source: Hart & Quinn (1993)

The four roles based on this model are: Vision setter, Motivator, Analyser, and Task master. Table 2.7 gives a brief overview of each of these roles. Hart and Quinn

(1993) empirically tested their model by developing an instrument of 16 items (four items for each role). They sought to investigate how the configuration of these roles differs according to the state of a firm's performance (high/low)—which is interesting because it aligns with the aim of this study's desire to investigate how the configuration of the CIO roles differs across the OLC stages.

**Table 2.7 Hart & Quinn's Manager Roles**

Quadrant	Roles Involved	Role Definition
Flexibility- Internal focus	The motivator	Translating the vision and economic strategy of the firm into a 'cause worth fighting for'- a core set of concepts and priorities which infuse and mobilize the entire organisation
Flexibility- External focus	The vision setter	Creating a sense of identity and mission-the definition and articulation of the firm's basic purpose and future direction
Stability-Internal focus	The analyser	Focusing on the efficient management of the internal operating systems in the interest of serving existing product-markets
Stability-External focus	The task master	Concerned about firm performance and results-getting the job done today

Source: (Hart & Quinn 1993)

Reviewing the previous approaches and typologies developed to describe managers' work in this study can be justified on several reasons. First, some could argue that these classical approaches are solely a part of the managerial history—no more no less. However, from this study's point of view it is an essential section because it represents the parent theory of much previous and current CIO literature as outlined in the next section where the CIO literature is reviewed extensively. Secondly, there is no doubt that CIOs are considered managers whether they are operational, functional, or senior and so forth. Hence, all previous and modern approaches that relate to managerial work in general will be applicable and provide insights into the CIO management position. Furthermore, understanding and assimilating previous literature on managerial work no doubt helps identify research gaps, methodologies used, problems encountered, key words and terminologies, key researchers in the field and other important issues. That will assist new and established researchers alike to conduct relevant research that addresses important gaps in the literature,

replicates methodologies utilized, and collects the most relevant literature using key words and key authors' names. To sum up, conducting a brief review of the previous typologies that describe managerial work is justified because it is considered appropriate and relevant to an informed understanding of the CIO's role.

### **2.3.2 The Chief Information Officer Role**

In this section an overview of the chief information officer (CIO) role will be provided. This section comprises three sub sections. The first defines the subject matter of the current study (CIO) in terms of the definition of this concept; followed by a discussion on how this role has evolved throughout the last three decades. Next, previous literature that attempted to apply classical roles typologies or suggest new roles configurations for the CIO will be reviewed in the final sub section.

#### **2.3.2.1 CIO concept**

In order to clarify the concept of the CIO—which is frequently described by the literature as ill-defined (Ayati & Curzon 2003; Daum et al. (2004); Feldhues 2008; Hawkins 2004; Romanczuk & Pemberton 1997)—this study identified the most common definitions mentioned in the literature since the 1980s. Table 2.8 contains eight definitions for the CIO ordered chronologically with their main elements.

The perusal and closer examination of these definitions helps identify some key observations about the CIO concept as follows:

- ❖ Each definition reflects the status of the CIO role in that period of time.
- ❖ There is consensus among the authors that the CIO role is a senior executive.
- ❖ The chronological order of the definitions mirrors the evolving role of the CIO role from technician (Boyle & Burbridge Jr 1991; Synnott 1987; Synnott & Gruber 1981) to strategic leader (Agarwal & Beath 2007; Boyle 1994; Broadbent & Kitzis 2005; Chun & Mooney 2009; Emery 1991; Tansley et al. 2008).
- ❖ The main elements of these common definitions of the CIO role comprise the managerial level; responsibilities; reporting structure; background; and expected contribution.

Synthesising these five key elements provides a comprehensive definition of the CIO role concept as:

- ❖ *a senior executive ;*
- ❖ *reports mainly to the chief executive officer;*
- ❖ *having a unique and hybrid background knowledge of technology and business;*
- ❖ *responsible for delivering ICT services based on suitable ICT technologies that meet the internal and external stakeholders' needs of information; and*
- ❖ *contributes positively to aligning the IT organisation's strategy with the business strategy to create competitive advantages that add value to the organisation.*

**Table 2.8 Summary of the CIO Definitions**

Author(s)	Definition	Managerial Level	Reporting Structure	Experience Background	Responsibilities	Contribution
(Synnott & Gruber 1981)	Senior executive responsible for establishing corporate information policy, standard, and management control over all corporate information resources	✓			✓	
(Synnott 1987)	The highest ranking executive with primary responsibility for information management.	✓			✓	
(Boyle & Burbridge 1991)	An executive with board responsibility for information technology (e.g., data processing, telecommunication, and office automation) who reports to a high level corporate officer (e.g., president or CEO).	✓	✓		✓	
(Emery 1991)	A senior executive with both business and technical perspective, who can contribute actively to the formulation of an effective amalgamation of business strategies.	✓		✓		✓
(Broadbent & Kitzis 2005)	The most senior executive responsible for identifying information and technology needs and then delivering service to meet those needs.	✓			✓	
(Agarwal & Beath 2007)	A critical senior leader within the company with the responsibility to insure that the IT capabilities of the firm are aligned with the business strategy and that IT delivers the type of business value the firm seeks.	✓			✓	✓
(Tansley et al. 2008)	A senior management team member who is responsible for leveraging the present and future value of information and technology as well as being jointly responsible for the performance, growth, and governance of the organisation.	✓			✓	
(Chun & Mooney 2009)	Top level executive responsible for managing and leveraging technology to provide value to the business.	✓			✓	✓
<b>Total frequency of each attribute</b>		<b>8</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>3</b>

Source: Developed for this study

### 2.3.2.2 The evolution of the CIO role

Numerous studies have confirmed the evolving nature of the CIO role over the last five decades (Benjamin et al. 1985; Chun & Mooney 2009; Duffy & Jeffery 1987; Hunter 2010; Martinotti 2005; Nicou 2006; Rockart et al. 1982; Ross & Feeny 1999; Strickland 2011). However, three studies have attempted to conceptualize how the CIO role has evolved in terms of different time stages (Andrews & Carlson 1997; Duffy & Jeffery 1987; Ross & Feeny 1999).

Duffy and Jeffery (1987) pointed out that the effective CIO passes across four revolutionary stages. In the first stage, the CIO has recognized the possibility of using IT as a source of competitive advantage rather than a tool of office automation. In the second stage, the CIO role is classified as a high level position with power given to the CIO to advocate their vision of IT for the organisation in front of the senior executive's team. The opportunity given to the CIO in the second stage is negatively affected by two factors: lower reporting structure and the shortage of specialist support staff. In the third stage, the CIO is able to recruit the support staff to implement ICT based strategies that gain competitive advantage for an organisation. The birth of a full power CIO who will be able to manage the organisational IT capabilities in an effective fashion will be in the fourth stage.

Another point of view about how the CIO role has evolved is presented by Andrews and Carlson (1997) cited in (Adams & Weiss 2011). According to this research, evolution of the CIO role has occurred in four waves. To begin, in the first wave the CIO has played a role of 'glorified data processing' officer. In the second wave, the role played by the CIO was a 'technocrat'. In the third wave, the role of the CIO is cast as a business executive. In the fourth wave—the current business environment—the CIO is cast as playing a hybrid role of a technocrat business executive.

The most cited evolving path of the CIO role was that proposed by Ross and Feeny (1999). Three technological eras of ICT advancement have shaped the CIO role over time since the first commercial use of the computer as an advanced data processing tool. These are the Mainframe Era which started in late 1950s; the Distributed Era which started in the middle 1970s; and the Web-based Era which started in the early 1990s.

Table 2.9 illustrates a synthesis of the evolution of the CIO role over these three eras.



**Table 2.9 The CIO Role and its driving forces across three eras of evolution**

	Mainframe Era	Distributed Era	Web-based Era
<b>Applications Portfolio</b>	Transaction processing from order through delivery	Knowledge worker support; inter- organisational systems; process reengineering; ERP systems	Electronic commerce; knowledge management; virtual organisation and supply chain reengineering
<b>Executive Attitudes</b>	IT for cost displacement automation; From enthusiasm to cost-consciousness	Increased involvement in IT issues and governance; Polarization of attitudes: IT as strategic asset or cost to be minimized	IT, particularly Internet, viewed as transformational, a driver of strategy; IT investments now more attractive in terms of costs and time scales
<b>Dominant Suppliers</b>	IBM	Desktop providers- Microsoft, Intel; ERP Software providers- SAP, Oracle; Outsourcing companies-EDS, Andersen, CSC, IBM	Network product firms- Sun, Cisco, 3Com; Browser/Portal/Search engine providers? E-business consulting and service companies
<b>CIO Role and Responsibilities</b>	<i>Role:</i> Operational manager of specialist function <i>Tasks:</i> On-time delivery; Reliable operations	<i>Role:</i> Executive team member; Organisational designer; Technology advisor; Technology architect; Informed buyer <i>Tasks:</i> Manage federal IT organisation; Recruit and develop staff; Educate line management; Align IT with business; Design corporate architecture; Scan technologies; Stabilize and standardize infrastructure; scan services market; Develop alliances with key vendors	<i>Role:</i> Business Visionary <i>Tasks:</i> Develop new business models for the Internet; Introduce management processes that leverage the intranet

Source: Ross & Feeny (1999)

It is noticeable from Table 2.9 that, over the three eras, three factors have shaped the role of the CIO over time from functional manager to strategic partner then to business visionary: the organisational needs as represented by the IT applications utilized; the executives' vision about IT as represented by senior executives' attitude toward IT; and vendors' variety and technology availability.

A new era has been added to this framework Martinotti (2005) as a 'past bubble era', which started early in the new millennium as a result of the emergence of mobile computing and remains ongoing. Martinotti suggested a CIO role as leader of business and innovation strategies enabled by disruptive technologies in the fourth

era. Four years later Chun and Mooney (2009) confirmed the Martinotti's (2005) finding by identifying that the CIOs within the fourth era are in bifurcation points that oblige them to play one of two roles: either chief innovation officer or director of IT.

Business environment nowadays is witnessing the emergence of a new technological era represented by cloud computing, big data, and social networking. Consequently, the role of the CIO also could evolve to reach a new state which remains unknown in response to these new technological phenomena.

To sum up, the CIO role has evolved in a revolutionary manner on the corporate ladder to become that of a senior executive and c-suite member rather than an operational or functional manager, to be a strategist rather than a technician, and to be an initiator rather than responding to business strategy—and the CIO role continues to undergo change.

This study will explore how the CIO role evolves not across the technological eras but across the OLC stages. This will be a valuable contribution for this research as it provides an insight to the practising CIOs and for the scholars, as well as enabling a better understanding of this complicated role.

### **2.3.2.3 The CIO roles configuration**

IS scholars and practitioners have paid a significant attention to the role of the chief information officer (Chen & Preston 2007; Fisher 2003; Karimi et al. 1996b; Peppard et al. 2011; Stephens et al. 1992). In order to narrow the existent CIO literature to serve the aim of this study, this study will concentrate on studies that attempt to apply or suggest a configuration of roles for the CIO rather than those that tried to focus on one single role.

CIO role literature can be classified into two major groups. The first includes studies that attempted to apply the general manager classical roles typologies discussed earlier to the CIO. Whereas, the second has attempted to suggest new configurations of roles for the CIO differing from classical managerial approaches and considering at the same time the unique characteristics needed for this role. The next two parts will review these two groups of studies in detail.

#### **2.3.2.4 The CIO role based on classic typologies**

Since the first emergence of the CIO role in the early 1980s (Synnott 1987; Synnott & Gruber 1981) much has been written about it (Chen & Preston 2007; Fisher 2003; Karimi et al. 1996b; Peppard et al. 2011; Stephens et al. 1992). Brown (1993) asserted that the prior theories regarding managerial work and leadership is applicable to the CIO role and they could provide a useful base to build on as long as the CIO is a general manager. Consequently, many researchers have attempted to apply the roles developed for general managers to the position of the CIO. Table 2.10 provides a summary of key research that adopted the classical managerial roles configurations.

Some interesting observations have been revealed from the closer examination of these studies presented in Table 2.10. First, it confirmed the possibility to apply the general manager and leadership frameworks to the CIO role to provide a greater understanding of the importance of the CIO role. Second, it also confirms that the CIO role is evolving from focusing on the (communication) informatics role, such as the spokesman and the liaison officer (Grover et al. 1993) to playing a more strategic role focusing on change and innovation as an entrepreneur (Gottschalk 2000a; Karlsen, Gottschalk & Andersen 2002; Lineman 2006; Milliron 2008). Furthermore, it is clear that the Mintzberg's (1973) managerial roles typology was the most adopted framework in CIO role studies as ten out of eleven studies listed in Table 2.10 were based on it (Carter et al. 2011; Gottschalk 2000c, 2000a; Gottschalk 2002; Grover et al. 1993; Karlsen et al. 2002; Lineman 2006; Milliron 2008; Stephens 1995; Yang 2008). This provides further support for Mintzberg's managerial roles typology. Moreover, it indicates a gap in the CIO literature that needs to be addressed as the vast majority of the literature were based on Mintzberg's typology, whereas almost none have used the other three key management roles typologies of Adizes (1976), Quinn and colleagues (Quinn et al. 2006; Quinn & Rohrbaugh 1981) and, Hart and Quinn (1993).

**Table 2.10 CIO Roles based Classical Roles Typologies**

	Reference	Methodology	Based on	Sample	Country	Important Role(s) Found
1	(Grover et al. 1993)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	71 CIO and IS middle managers	USA	Spokesman and liaison roles
2	(Stephens 1995)	Observation	Mintzberg’s Managerial Role Typology	5 CIOs from different industries	USA	According to occurrence frequency : resource allocator, monitor, and distributor handler According to time spent: resource allocator, entrepreneur, distributor handler, and monitor roles
3	(Gottschalk 2000a)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	101 IS/IT leaders	Norway	The new IS/IT leaders spend more time in the Mintzberg’s informational roles than established IS/IT leaders.
4	(Gottschalk 2000b)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	101 IS/IT leaders	Norway	Strategic responsibilities as well as IS stage of growth influences the extent of informational roles. The extent to which the chief executives uses IT influences the extent of decisional roles, and the extent to which subordinates use of IT influences the extent of interpersonal roles.
5	(Gottschalk 2002)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	128 CIOs	Norway	Entrepreneur
6	(Karlsen et al. 2002)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	128 IT executives and 80 IT project managers	Norway	For IT leaders: monitor For IT project managers: leaders, resource allocator, and entrepreneur
7	(Lineman 2006)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	232 higher education CIOs	USA	Entrepreneur, resource allocator, and leader
8	(Gottschalk & Karlsen 2005)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	80 IT leader of firms that have internal IT projects + 84 IT leader of firms that have outsourcing projects	Norway	In firms with internal IT project: leader. In firms with outsourcing IT project: spokesman
9	(Yang 2008)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	IT managers of financial industry.	Taiwan	Liaison and spokesman roles
10	(Milliron 2008)	Mixed (Interviews + Survey)	Mintzberg’s Managerial Role Typology	10 CIOs of community college	USA	Monitor, liaison, and entrepreneur roles
11	(Tufts & Jacobson 2010)	Q-Methodology based on the CVF eight roles survey developed by Quinn et al (1990)	Quinn and Colleagues ( CVF) Roles Typology	67 Public CIOs	USA	Results oriented pragmatist; Compassionate managers; Leading edge powerbroker; and Goal oriented powerbroker
12	(Carter et al. 2011)	Quantitative -Survey	Mintzberg’s Managerial Role Typology	45 CIOs	USA	Monitor and Spokesperson

Source: Developed for this study

### 2.3.2.5 The CIO distinctive roles configurations

Karahanna and Watson (2006) argued that IS leadership is distinctive from leadership in general because the CIO is expected to combine IS technical skills with an in-depth understanding of business. As such, some MIS scholars have attempted to suggest some other distinctive roles for the CIO that differ from the classic managerial roles explained earlier and consider at the same time the unique characteristics for this role. This attempt was based on the fact that Mintzberg (1971) himself has asserted that all managers indeed are specialists and that means their roles tend to be dependent on the functional area they lead. Table 2.11 sheds some light on the key configurations of CIO roles suggested in the literature over the last couple of decades.

Several important conclusions can be drawn from Table 2.11. First of all, we can classify the CIO role configurations conceptually (N=8) and empirically (N=16). The early six configurations were conceptual. The (16) empirical based configurations in turn can be classified based on the methodology utilized into three groups as follows: Quantitative (N=6); Qualitative (N=7); and Mixed (N=3). Two thirds of the role configurations were developed in the USA (N=16), nearly one third of them were developed in the UK (N=5), the rest were developed in China and Taiwan (N=2) or worldwide (N=2). The number of suggested CIO roles ranges from three to eight. Largest configurations in terms of number of roles (7 and 8 roles) tend to break down main roles into much more specific roles for the sake of further explanation, while shorter configurations (3 and 4 roles) tend to merge two or more CIO roles for the sake of parsimony. The early roles configurations developed within the 1980s and the most recent CIO roles configurations include both operational (supply side) roles and strategic (demand side) roles. This indicates that the shift in CIO role from the technical role to a more strategic role started in the late 1980s. These roles configurations studies confirm that the CIO is performing multiple roles (a configuration of roles), not one or two specific roles. The IS scholars give different names for the CIO roles. The most cited CIO role configuration based on the data provided by Google Scholar (23/12/2012) is Smaltz et al. (2006) then Chun and Mooney (2009). After rational examination and comparison of empirical based quantitative CIO role configurations, this research will adopt the six CIO roles configuration proposed by Smaltz et al. (2006). The main features of this configuration

of roles along with justification for choosing this configuration of the CIO roles for this study's dependent variable will be provided later in the focus theory section.

Table 2.11 CIO Key Roles Configurations

	Reference	Methodology	Type	Country	Number of Roles	Roles Label	Citation percentage per year
1	(Synnott & Gruber 1981)	-	Conceptual	USA	6	Change agent, Proactivist, Politician, Integrator, Information controller, and Staff professional	7.1%
2	(Dixon & John 1989)	-	Conceptual	USA	3	Partner consultant, Strategy planner, and manager of technology infrastructure	4.34
3	(Klenke 1993)	-	Conceptual	USA	4	Decision maker, Motivator, Change agent ,and Strategist	0.73
4	(McLean & Smits 1993)	-	Conceptual	USA	4	Technologist, Manager, Strategist, and Innovator	0.26
5	(Klenke 1996)	-	Conceptual	USA	4	Boundary spanner, Synergy promoter, Steward, and Designer of virtual organisation	0.25
6	(CSC 1996)	-	Conceptual	UK	6	Chief architect, Change leader, Product developer, Technology provocateur, Coach, and Chief operating	-
7	(Feeny 1997)	Qualitative (Interviews)	Empirical	UK	4	Technical virtuoso, Relationship builder, Systems thinker, and Supply manager	0.53
8	(Earl 1996)	Qualitative (Interviews)	Empirical	UK	8	Past roles: Visionary, Deliverer, Tactician, and Relationship builder Future roles: Systems thinker, Architect, Reformer, and Alliance-manager	2.28
9	(Smaltz 1999)	Quantitative (Survey)	Empirical	USA	6	Business partner/Strategist, IT contract oversight, Integrator, Informaticist/IT	0.92
10	(McLean & Smits 2003)	Qualitative (Interviews)	Empirical	USA	4	Technologist, Enabler, , Innovator and Strategist (Ordered as the CIO must start with technologist and then move to other role as ordered)	-
11	(Cash & Pearlson 2004)	-	Conceptual	USA	5	Business strategist, IT strategist, IT functional leader, Technology advocate, and Change agent	0.87
12	(Perchthold 2005)	-	Conceptual	USA	3	Strategist, Purchaser, and Technologist	-
13	(Sojer et al. 2006)	Quantitative (Survey)	Empirical	USA	4	Supporter, Enabler, Cost Cutter, Driver	1
14	(Smaltz et al. 2006)	Quantitative (Survey)	Empirical	USA	6	Strategist, Relationship architect, Integrator, Educator, Information Steward, and Utility provider	12.57
15	(Agarwal & Beath 2007)	Qualitative (Interviews)	Empirical	USA	7	Strategist, Relationship architect, Integrator, Educator, Information Steward, Utility provider, and Leader	0.83
16	(Tansley et al. 2008)	Qualitative (Interviews)	Empirical	UK	5	Traditional IT Manager/Director, Evangelist, Innovator, Facilitator, and CIO Metamorphosis	-
17	(Weiss & Adams 2010)	Mixed (online Survey+ interviews)	Empirical	USA	3	Technologist, Change agent, and Business expert	1
18	(Wu et al. 2008)	Quantitative (Survey)	Empirical	Taiwan & China	8	Business visionary/Strategist, Business systems thinker, Value configure, Entrepreneur, Infrastructure builder, Organisational designer, Relationship builder, Informed buyer	1.5
19	(IBM 2009)	Qualitative (Interviews)	Empirical	78 Countries	3 Pairs	<ul style="list-style-type: none"> <li>• An Insightful Visionary and Able Pragmatist</li> <li>• A Savvy Value and a Relentless Cost Cutter</li> <li>• A Collaborative Business Leader and Inspiring IT Manager</li> </ul>	-
20	(Chun & Mooney 2009)	Mixed ( Secondary data + interviews)	Empirical	USA	4	Landscape Cultivator, Innovator& Creator, Opportunity Seeker, Triage Nurse & Firefighter	12

**Table 2.11 CIO Key Roles Configurations (continued)**

	Reference	Methodology	Type	Country	Number of Roles	Roles Label	Citation percentage per year
21	CIO Magazine 2009	Quantitative (Survey)	Empirical	USA	3	Transformational Leader, Function Head, and Business Strategist	-
22	(Peppard et al. 2011)	Qualitative (Semi-structured Interviews)	Empirical	UK	5	Utility IT Director, Evangelist, Innovator, Facilitator, Agility IT director	4
23	(Chen & Wu 2011)	Quantitative (Survey)	Empirical	Taiwan & China	8	Business visionary, Business systems thinker, Value configure, Entrepreneur, Infrastructure builder, Organisational designer, Relationship builder, Informed buyer	5
24	(Nicolet 2011)	Mixed (Survey + Interviews)	Empirical	USA	6	Technologist, Strategist, Facilitator, Educator, Manager, and Implementer	-
25	(Weill & Woemer 2013)	Mixed (Survey + Interviews)	Empirical	USA	4	IT services CIO, external customer CIO, embedded CIO, and enterprise process CIO	1

Source: Developed for this study



## **2.4 Focus Theory & Developing a Theoretical Framework**

In order to synthesize the theoretical model of this research and building upon the parent theories reviewed in previous sections, this section will narrow the review process towards the research constructs operationalized and investigated in this study.

This section is divided into three parts. The first part deals with the literature related to organisational life cycle (OLC) models, justification for the five stages OLC model chosen and the characteristics of each stage in that model. Then, an extensive review of the literature regarding the chief information officer (CIO) is conducted in order to choose and justify the suitable configuration of CIO roles and define each role included in the chosen configuration. The third section presents the theoretical framework that illustrates the research six hypotheses tested in this study.

### **2.4.1 Lester et al (2003) OLC model**

Based on a synthesis of existing OLC models, Lester et al. (2003) proposed a new five-stage OLC model for comprehensiveness and parsimony. Lester et al. (2003) argued that their five stage model is different from existing five stages models on two features. First, this model is applicable for all types of organisations regardless of its size or type. Second, this five stage OLC model acknowledges the decline stage as a distinctive stage that can occur at any stage of the OLC—not solely at the end of the organisation life as some organisation theorists had previously suggested.

Based on Hanks's (1990) definition of the life cycle stages as a 'unique configuration of variables related to organisation context, strategy and structure' and Miller and Friesen's (1984) four major gestalts including strategy, structure, decision making style, and organisational situation, Lester et al. (2003) employed four major variables—organisational situation, decision making style, organisational structure, and information processing—to categorize the organisations into individual life cycle stages. The variable strategy was excluded by Lester et al. (2003) because it is not

always an accurate predictor (Lester 2004b; Lester & Parnell 2008a). It is anticipated that each stage will exhibit certain significant differences from all other stages based on these four classes of variables. The characteristics of each of five stage of OLC model developed by Lester et al. (2003) are presented in Table 2.12.

**Table 2.12 The Characteristics of the Five OLC Stages**

Life Cycle Stage	Stage		Gestalt	
	Strategy	Structure	Decision Making Style	Situation
<b>Existence</b>	Prospector (Niche)	Informal; simple; owner dominated	Highly centralized; bold; trail & error	Small; homogenous environment
<b>Survival</b>	Analyzer (Incremental innovation)	Functional; some formality	Less centralized; begin formal information processing	Medium-sized; more heterogeneous environment; more competitive
<b>Success</b>	Defender (Focus on efficiency)	Formal; Bureaucratic; Functional	Moderately centralized; reliance on internal information	Larger; more heterogeneous environment
<b>Renewal</b>	Analyser (High level of risk taking)	Divisional	More formal analysis; sophisticated information processing	Very large; very heterogeneous environment
<b>Decline</b>	Reactor (Risk averse)	Formal; bureaucratic; functional	Moderate centralization; less sophisticated information processing	Homogenous and competitive environment

Source: Lester (2004a)

There are several reasons behind the rationale for choosing the Lester et al.'s (2003) five stage OLC model as a frame model to explore the CIO role across its five stages. First, it is developed from the existing literature and then empirically tested. Secondly, it is a universal model so is applicable for all organisations regardless of size and type, which is important for this study as it targeted different sized firms from different industries. Thirdly, it is a comprehensive yet parsimonious model. Furthermore, it is one of few natural models that describe the organisational growth from birth to death as it includes the decline stage as a separate, identifiable set of organisational activities and structures that provide the opportunity to explore the CIO role during this important stage. Moreover, it includes a concise scale to categorize the organisations into the five stages based on the manager's perception. This scale has demonstrated moderately high validity and reliability indicators. Moreover, it has been operationalized and empirically tested by a number of prior

studies in different contexts, including Australia (e.g. Perenyi et al. 2011b, 2011a; Lester & Parnell 2008a, 2008b; Beuren, Rengel and Hein 2012).

## 2.4.2 Smaltz et al. (2006) CIO role configuration

Smaltz et al. (2006) developed and tested their CIO role configuration model based on data collected by Smaltz (1998, 1999). Building upon role-based performance theory and based on a comprehensive inventory of CIO roles identified from the literature along with data collected from interviews of three healthcare CIOs and three healthcare top management team members, Smaltz et al. (2006) suggested six salient roles for the CIO. Smaltz and colleagues argued that the CIO role effectiveness can be described in terms of these six roles. Table 2.13 provides a brief description of these six roles.

**Table 2.13 The Chief Information Officer Six Roles**

<b>Supply Side Roles</b>	<b>Demand Side Roles</b>
<b>Educator:</b> The role of the CIO as an IT missionary, who provides insight and understanding about key information technologies to increase top management savviness, awareness, and appreciation of IT and help them to make appropriate judgments about the business value of IT and wise IT investment decisions.	<b>Strategist:</b> The organisational desire for the CIO to be an effective business partner and help his/her organisation leverage valuable opportunities for IT-based innovation and business process redesign.
<b>Information Steward:</b> The desirability of the CIO to be an organisational steward for high quality data and operationally reliable systems.	<b>Relationship Architect:</b> The desirability of a CIO to build relationships both across the enterprise as well as outside the enterprise with key IT service provide
<b>Utility Provider:</b> The role of the CIO as a builder of sustaining, solid, dependable, and responsive IT infrastructure services.	<b>Integrator:</b> The desirability of the CIO providing leadership in enterprise-wide integration of processes, information, and decision-support as digital options for the business

Adopted from Smaltz et al. (2006)

This study will adopt the Smaltz et al. (2006) CIO role configuration as a dependent variable for several reasons. First, this CIO role configuration was developed from the comprehensive inventory of CIO roles identified from previous literature and empirical data obtained from in-depth interviews with CIOs and top management members. Second, it represents a comprehensive configuration that accommodates all other empirical CIO role configurations discussed previously and displayed in Table 2.14. Also, despite the fact that this CIO role configuration was developed within the healthcare sector, the roles emerged were similar to the ones that have

been identified in the literature up to now (Strickland 2011). Furthermore, Agarwal and Beath (2007) found that all these roles included in this configuration were important in grooming the future CIOs, regardless of their industry. Moreover, this configuration has been proved to be a valid typology within the Australian context (Seddon et al. 2008). Additionally, Smaltz et al. (2006) have classified these six roles into two groups: supply side role (utility provider, information steward, and educator) and demand side role (integrator, relationship architect, and strategist) following the modern classification of the CIO roles proposed by Broadbent and Kitzis (2005); Mark and Rau (2006) and Mark and Monnoyer (2004). The supply side role refers to the traditional role for the CIO as a technician who focuses on the operational side of IT only to support business needs; while the demand side role refers to the business side of the CIO role as a strategist or a visionary leader who focuses on creating new IT-enabled business initiatives that add value to the organisation (Smaltz et al. 2006). Also, this CIO roles configuration has been measured by a survey instrument that demonstrated high validity and reliability (Al-Taie et al. 2013; Chen et al. 2010a; Chen & Wu 2011; Li et al. 2012; Wu et al. 2008). Finally, the survey instrument for this CIO configuration is concise. This is crucial as the targeted survey respondent is the most senior IT executive in the organisation who is extremely busy and is unlikely to fill out a lengthy survey.

**Table 2.14 Mapping of Smaltz et al.'s (2006) six CIO roles configuration with other CIO role configurations**

<b>Smaltz et al (2006) Roles</b>	<b>Demand Side Roles</b>			<b>Supply Side Roles</b>		
<b>as a reference configuration</b>	<b>Strategist</b>	<b>Relationship Architect</b>	<b>Integrator</b>	<b>Educator</b>	<b>Information Steward</b>	<b>Utility Provider</b>
(Synnott & Gruber 1981)	Change agent/Proactivist	Politician	Integrator	-	Information Controller/ Staff Professional	-
(Feeny 1997)	System thinker	Relationship builder	-	-	Technical Virtuoso	Supply manager
(Earl 1996)	Visionary/Systems thinker	Relationship builder / Alliance- manager	-	-	Tactician /Reformer	Deliverer /Architect
(McLean & Smits 2003)	Strategist/ Innovator	Innovator/Enabler	Innovator	-	Enabler	Technologist
(Sojer et al. 2006)	Driver	Enabler	-	-	-	Supporter/Cost cutter
(Agarwal & Beath 2007)	Strategist	Relationship Architect	Integrator/Leader	Educator	Information Steward/Leader	Utility Provider
(IBM 2009)	Savvy value creator	Collaborative business leader	Insightful visionary	-	-	-
(Chun & Mooney 2009)	Innovator & Creator	-	Opportunity Seeker	-	Triage Nurse	Landscape Cultivator
(Weiss & Adams 2010)	Change agent/Business expert	Change agent	Technologist	-	-	Technologist
(Tansley et al. 2008)	Innovator	-	Facilitator	Evangelist	-	Utility IT Director/Agility IT director
(Chen & Wu2011; Wu et al. 2008)	Business visionary, business system thinker, entrepreneur; and value configure	Relationship builder; value configure; and informed buyer	Organisational designer (Coordinating)	-	Organisational designer (Staff)	Infrastructure builder
(Nicolet 2011)	Strategist	-	Facilitator/Manager	Educator	-	Technologist/Implementer

Source: Developed for this study

### 2.4.3 An Integration of Managerial Work and Organisational Life Cycle

Different aspects of managerial and leadership work have been investigated within the context of organisational life cycle throughout the last five decades. Table 2.15 presents previous literature that incorporated managerial work within the contingent role of the OLC.

Some significant conclusions can be drawn from Table 2.15 :

- ❖ The studies that integrate the managerial work and the OLC theory can be grouped into two major groups: conceptual (N=18) and empirical (N=17). Most early studies are conceptual, whereas most later studies are empirical that indicating a scholarly trend towards conducting empirical studies in this field and their acknowledgment regarding the maturity of theoretical background of this research area.
  
- ❖ At least 14 distinctive themes can be distinguished from the 35 studies presented as follows: (1) the appropriate management/leadership style in each stage of the OLC (Bayers 2011; Cowen, Middaugh & McCarthy 1984a; Cowen et al. 1984b; Hersey, Blanchard & Johnson 1996; Lindell 1991; Miller 1990; Rothschild 1993; Schmid 2006; Wall 1989); (2) managers/leaders roles across the OLC stages (Bonn & Pettigrew 2009; Burns 1997; Chang 2009; Galbraith 1982; Roche 2009; Rothschild 1993; Ward 2003); (3) how managers/leaders diagnose and treat organisational crises during the OLC stages (Adizes 1979; Greiner 1972; Lippitt & Schmidt 1967; Santora & Sarros 2008; Sykes & Block 1989); (4) the impact of manager/leaders on the successful transition through the OLC stages (Bayne 2005; Lester 2004a; Lester, Parnell & Frey 2002; Ward 2003); (5) managers behaviour across the OLC stages (Huse & Zattoni 2008; Müller, Volery & Von Siemens 2012); (6) executives/board of directors compensations during the stages of the OLC (Lynall, Golden & Hillman 2003; Tsai 2011); (7) leadership demand, constraints, and choices in each stage of the OLC (Baliga & Hunt 1988; Hunt, Baliga & Peterson 1988); (8) moderating effect of the OLC (Harjoto & Jo

2009; Zahra & Pearce 1989); (9) directors selection across the OLC stages (Johnson 1997); (10) management competencies (Thommen & Behler 2002); (11) managers' traits (Qiu 2010); (12) top management priorities (Smith et al. 1985); (13) management cognitive style (Vaseghi & Vaseghi 2011); and (14) managers' decision making style in each of the OLC stages (Rowe & Boulgarides 1994).

- ❖ Most studies treated the OLC as an independent variable, whereas few of them have acknowledged it either as a dependent variable (Bayne 2005; Lester 2004a; Lester et al. 2002) or as a moderating variable (Harjoto & Jo 2009; Zahra & Pearce 1989).
- ❖ The most widely-used methodologies in empirical studies were case studies (N=5) and; interviews (N=3); followed by surveys (N=3); secondary data (N=2); mixed (N=2); and observation, comparative approach (N=1 each).
- ❖ As far as the sample size is concerned, the number of executives that participated in the studies presented in Table 15 ranges from 9 to 147, which indicates a small sample size as it deals with executives who are always busy.
- ❖ Most studies are conducted in the USA (N=21); then Canada (N=3); then China and Finland (N=2 each); then Australia, Switzerland, Taiwan, Germany, and Israel (N=1 each).

**Table 2.15 Summary of literature that integrated managerial work with the OLC**

Reference	Type	Methodology/ Sample	Country	Focus
(Lippitt & Schmidt 1967)	Conceptual	-	USA	Executives actions regarding the crises across the three OLC stages
(Adizes 1979)	Conceptual	-	USA	Diagnosing and treating the OLC problems of organisation
(Galbraith 1982)	Conceptual	-	USA	Identified the appropriate form of organisation for each stages of the six stages of the OLC
(Cowen et al. 1984a, 1984b)	Conceptual	-	USA	Evolution of management style across four OLC stages
(Smith et al. 1985)	Empirical	Mixed/ 38 CEOs for interviews +27 CEOs for questionnaires	USA	Identified the top management priorities in different stages of the OLC
(Hunt et al. 1988)	Conceptual	-	USA	Examined the impact of different aspects of leadership at the strategic apex on the organisational excellence over five stages of the OLC
(Baliga & Hunt 1988)	Conceptual	-	USA	Examined leadership in the context of organisationally-derived managerial tasks in different phases of the OLC
(Miller 1990)	Conceptual	-	USA	Investigated the relationship between the life cycle of an organisation and the nature of its leadership
(Zahra & Pearce 1989)	Conceptual	-	USA	Synthesized empirical research findings on the impact of board of directors on corporate financial performance
(Sykes & Block 1989)	Conceptual	-	USA	Obstacles to corporate new venture initiated within a mature companies
(Wall 1989)	Empirical	Quantitative- Survey/ 140 mid-level and upper level managers	USA	Examined the variation of leadership styles and the organisational climate across four stages of the OLC
(Lindell 1991)	Empirical	Case study/ One firm	Finland	Investigated the change in management style across three OLC stages
(Rothschild 1993)	Conceptual	-	USA	Explained different types of strategic leaders needed throughout the OLC stages
(Rowe & Boulgarides 1994)	Conceptual	-	USA	Managerial decision making process
(Hersey et al. 1996)	Conceptual	-	USA	Integrating situational leadership with the OLC theory( based on Grainer's model 1972)
(Burns 1997)	Conceptual	-	USA	Examined how the OLC affect non-profit firms' boards
(Johnson 1997)	Conceptual	-	USA	Identified the criteria by which directors of the corporate board are selected and how these criteria change over the OLC stage
(Thommen & Behler 2002)	Empirical	Quantitative- Survey/ Not Given	Germany	Management competencies
(Lester et al. 2002)	Empirical	Qualitative- interviews/ Three TMT members of three case studies firms in different life cycle stages	USA	Explored the influence of TMT on the OLC
(Lynall et al. 2003)	Conceptual	-	USA	Developed a theory to show how board composition and firm performance are reflective of the OLC stages
(Ward 2003)	Conceptual	-	USA	How leaders role differ over the OLC stage and how they facilitate the firm transition from one stage to another
(Lester 2004a)	Empirical	Qualitative- interviews /24 Vice President OR Managing Directors	USA	Explored the successful navigation of all OLC stages excluding decline , by FedEx founder and CEO



**Table 2.15 Summary of literature that integrated managerial work with the OLC (continued)**

Reference	Type	Methodology/ Sample	Country	Focus
(Bayne 2005)	Empirical	Comparative approach / One survived firms	Canada	Explored why this case study survive across its life over 34 years while similar firms failed
(Schmid 2006)	Empirical	Case study/4 case studies	Israel	Described how different leadership style fit different situations and contingencies at different stage of the OLC
(Santora & Sarros 2008)	Empirical	Case study/ One case study	USA	Explained the importance of learning the component of the OLC for the non-profits founders /leaders to prevent the demise of their firms
(Huse & Zattoni 2008)	Empirical	Case study / Three case studies firms	Finland	Explored how the actual board behaviour in small firms change as the firm change across the OLC stages.
(Chang 2009)	Empirical	Quantitative- Survey /60 HR manager	Taiwan	How the role of the HR manager and HR department role differed across the stage of the OLC
(Harjoto & Jo 2009)	Empirical	Secondary Data /2681 firm	USA	Examined the CEO power and the effect of this power on the firm performance in early stages and late stages of the OLC
(Bonn & Pettigrew 2009)	Conceptual	-	Australia	The roles of board of directors change over the OLC stages
(Qiu 2010)	Empirical	Mixed/147 Senior Managers	China	Examined the traits of managers in different stages of the OLC
(Roche 2009)	Empirical	Qualitative-Interviews /34 Board members	Canada	Examined Some governance issues including directors roles across three stages of the OLC
(Tsai 2011)	Empirical	Secondary data/ ?	China	Examined the relationship between organisational performance and executives' compensation within the OLC stages
(Bayers 2011)	Empirical	Case study / One case study firm	USA	Explore the relationship between leadership style and the OLC
(Vaseghi & Vaseghi 2011)	Conceptual	-	Canada	Identified the desirable cognitive style (decision –making profile) for executives at each stage of the OLC
(Müller et al. 2012)	Empirical	Structured Observation/6 entrepreneurs in the start-up stage and another 6 entrepreneurs in growth stage	Switzerland	Compare the behaviour of two groups of managers in start-up and growth stages of the OLC

Overall, the scholarly literature presented in Table 2.15 confirmed that management/leadership style; role and responsibilities; behaviour; demand; constraints; choices; competencies; traits; cognitive style; priorities; criteria of selection; and decision making style differ across the organisational life cycle.

From this perspective, existing literature supports the overall main hypothesis of this study as follows:

*H1: The configuration of the CIO roles differs across the five stages of the OLC*

However, this leads to a key question that needs to be answered:

**What is the composition or the ‘make up’ of the CIO role configuration at each stage of the OLC?**

It is difficult to provide a precise answer to this question at this stage due to the lack of previous research that specifically investigated the CIO roles during the OLC stages. Hence, the nature of this study will be exploratory. This study will develop the relevant hypotheses regarding the CIO role configuration at each stage of the OLC based on the available literature that is logically assumed to link with the CIO role in an organisation such as the nature of information processing, IT capabilities, IT expenditure, and IT maturity stages. Table 2.16 synthesises some related variables with the OLC in order to develop the hypotheses for predicting the likely CIO roles configuration at each stage of the OLC.

**Table 2.16 Synthesizing variables that might impact the CIO role configuration stage-wise**

OLC Stages Other Related variables	Early Stages		Late Stages & Decline		
	Existence	Survival	Success	Renewal	Decline
<b>Information processing</b> (Lester et al. 2003)	Simple	Monitoring performance focus	Sophisticated	Complex	Not sophisticated, but badly needed
<b>IT Expenditure</b> (Gupta & Chin 1991)	Low	Higher	Highest	Highest	?
<b>IT Capabilities</b> (Lester & Tran 2008; Lester et al. 2011)	Creativity-Open source collaboration, Website; Connectivity-Website, E-mail; Design-CAD/CAM	Flexibility-Project planning and scheduling software, inventory management systems; Training-Online recruitment and training systems; Communication-Web-linked value chain activities	Customer relation-CRM software; Market responsiveness-Blog, E-mail, text messaging; Marketing-Website, Social networking site	Efficient production-Web-Linked value chain activities; Back-office support-Automation software for accounting, payroll, purchasing, travel, etc; Collaboration-Website	?
<b>IT Role</b> (McFarlan, McKenney & Pyburn 1983) <b>and its requirements</b> (Earl 1989)	Support IT role requires:  IT Manager Hand-on approach Technical skills Service orientation IT career	Turnaround IT role requires:  IT Director Near the board Business knowledge Visionary orientation IT or general career	Factory IT role requires:  IT Executive Operations approach Line management skills Performance orientation IT or line career	Strategic IT role requires:  IT Director On the board Organisational leadership Business orientation General or IT career	?
<b>IT Maturity Stages</b> (Gibson & Nolan 1974)	Initiation	Expansion	Formalization	Maturity	?
<b>Information Intensity of the Value Chain</b> (Porter & Millar 1985)	Low		High		?
<b>Strategic IT Vision</b> (Schein 1992)	Automate	Informat-Up	Informat-Down	Transform	?
<b>Leadership Life Cycle</b> (Ward 2003)	The Creator	The Accelerator	The Sustainer	The Transformer	The Terminator
<b>CIO Role Configuration</b>	Dominated by supply side roles focus		Dominated by demand side roles focus		

Source: Developed for this study

Following Engelen, Brettel and Heinemann (2010) and Koberg et al. (1996), and in order to facilitate formulation of precise hypotheses, this study will group the first four stages of the OLC into two groups as shown in Table 2. Koberg et al. (1996) justified their attempt to classify the stages of the OLC by referring to Kazanjian's (1988) findings. Kazanjian argued that while an organisation's external relations and organisational systems changed only marginally between the first and the second stages of the OLC and between the third and the fourth stages, changes between the first two stages (early) and the latter two stages (late) were significant.

Literature showed that the early stages of the OLC (existence and survival) can be described as young, are informal or at the early stage of formalization structure, the decision making is in the hand of owner(s)/founder(s) or a small number of managers. The information processing can best described as simple or focused on monitoring performance (Lester et al. 2003; Miller & Friesen 1984). In other words, the earlier stages of organisational development emphasise flexibility, informality, and simplicity (Engelen et al. 2010). In the early stages, IT expenditures are relatively low (Gupta & Chin 1991), therefore, it is most likely to be at the early stages of the IT maturity model (initiation or expansion) (Gibson & Nolan 1974). The IT capabilities in the early stages have been found to be relatively less mature (Lester & Tran 2008; Lester et al. 2011). The role of IT at these stages is likely to be supportive (McFarlan et al. 1983). The most likely leadership roles to be played by managers at these stages are creator or accelerator (Ward 2003). This cumulative picture drawn from previous literature suggests a supply side role (operational) focused CIO in the early stages of the OLC, hence, the relevant literature suggests the following hypothesis:

***H2:** The characteristics of early stages of the OLC (Existence and Survival), predominates operational/supply side roles of the CIO (Utility Provider, Information Steward, and Educator).*

On the other hand, organisations in late stages (Success and Renewal) can best be described as large, and have formalized structure. Their information processing is complex and sophisticated, and the top management team focuses on planning and

strategy, leaving daily operations to lower level managers (Lester et al. 2003; Miller & Friesen 1984). Engelen et al. (2010) argued that later stages of the OLC are characterised more by inflexibility, formality, and complexity. The expenditure of IT is relatively high (Gupta & Chin 1991), so it most likely to be at the late stages of IT maturity as suggested by Gibson & Nolan (1974). IT capabilities become wider and more mature (Lester & Tran 2008; Lester et al. 2011); and IT is assumed to play a strategic role as argued by McFarlan et al. (1983). Leaders in these stages are more likely to play either sustainer role or transformer role (Ward 2003). This cumulative picture drawn from previous literature suggests a demand side (strategic) role focused CIO at the late stages of the OLC. Hence, the relevant literature suggests the following hypothesis:

***H3:** The characteristics of late stages of the OLC (Success and Renewal), predominates strategic/demand side roles of the CIO (Integrator, Relationship Architect, and Strategist).*

The decline stage could be the most difficult stage to predict as it might occur at any stage of the OLC (Lester et al. 2003). Organisational decline refers to ‘an organisational state of poor adaptability, consistently depleting resources, reduced legitimacy, and high vulnerability’ (Carmeli & Sheaffer 2009). The organisation in this stage experiences a reduction of profit and loss of market share (Miller & Friesen 1984). According to Mintzberg (1984), this stage is characterised by politics and power. Therefore, the relationship with the powered insiders (e.g. CEO, other executive members, and board of directors) and outsiders (e.g. suppliers and creditors) will be crucial. It has been argued that the corporate mission and strategy would be the main business task at the decline stage (Hanks et al. 1993). Bonn and Pettigrew (2009) pointed out that declined organisations focus on ‘retrenchment’ activities such as cost and asset reductions and ‘recovery response’ activities such as acquisitions, the development of new products and markets and increased market penetration. The recovery activities require CIOs to play a business strategist role to present IT as a modern way to create new products and/or services that maintain current customer loyalty and attract new customers, or to update the dated organisational processes which become unsatisfactory. The retrenchment activities in

turn drive organisations toward information systems outsourcing (Gefen, Ragowsky, Licker & Stern 2011b; Jawahar & McLaughlin 2001; Smith, Mitra & Narasimhan 1998). The use of outsourcing to deliver IT services shifts the role of the CIO from IT service provider to business integrator (Gefen et al. 2011b). Hence, the relevant literature suggests the following hypothesis:

*H4: The characteristics of decline stage of the OLC, predominates strategic/demand side roles of the CIO (Integrator, Relationship Architect, and Strategist)*

## **2.4.4 Research Moderating Variables**

The moderating variables refer to ‘a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable’ (Baron & Kenny 1986, p. 1174). In this study, two moderating variables were chosen due to their potential interaction effect on the relationship between the OLC stages and the CIO roles.

### **2.4.4.1 The moderating effect of information intensity**

Porter and Millar (1985) were among the first researchers to examine information intensity and its effect on the role of IT in organisations. According to Porter and Millar (1985), information intensity for a given firm can be identified by two main dimensions: the first is the extent to which the information contributes to transforming the firm’s value chain and, second, the information content of the firm’s product. These two dimensions were used to formulate the information intensity matrix presented by Porter and Millar (1985) as a tool to position firms/industries according to their information intensity. Wynne (1989) considered information intensity as an important aspect of IT measurement that applies to all three levels of information technology application: for efficiency as in automation; for effectiveness as in productivity; and for innovation as in strategic management. The information intensity refers to ‘the significance of the information component in value chain activities’ and is demonstrated by the level of accuracy, frequency of

updates, and the magnitude and extent of information employed in operations (Busch, Jarvenpaa, Tractinsky & Glick 1991; Teo & King 1997) (as cited in Kearns & Lederer 2003, p. 5).

Based on a survey of 161 US firms, Kearns and Lederer (2003) reported a positive and significant association between the information intensity of a firm and the participation of the CEO and the CIO in IT and business planning. Kearns and Lederer (2004) also confirmed that information intensity has a significant impact on business dependence on IT; IT participation in business planning; and alignment between the IT and the business plans. It is anticipated that as the information processing and decision making process complexity increases as the firm moves from one stage of the OLC to the next (Lester et al. 2003), the information intensity of the value chain of the firm might also rise in terms of the magnitude and extent of information employed in operations—which, in turn, could impact on the CIO role in an organisation. Hence, the CIO role in firms at the existence stage of the OLC for example with low information intensity might differ from the CIO role in a firm in the same stage with high information intensity. Hence, the relevant literature suggests the following hypothesis:

*H5: Organisational information intensity moderates the relationship between the OLC stages and the CIO roles.*

#### **2.4.4.2 The moderating effect of strategic IT vision**

Strategic IT vision refers to ‘the shared, aspired state of the role that IT should play in the firm’ (Robbins & Duncan 1988; Zmud 1988 as cited in Armstrong & Sambamurthy 1999). It is worth mentioning that different names have been used interchangeably for this construct such as the CEO’s basic assumption about IT (Kaarst-Brown 2005; Schein 1989; Schein 1992); IS orientation (Teo & Too 2000); IS/IT role (Chen, Mocker, Preston & Tuebner 2010b; Feeny et al. 1992; Hallikainen, Hu, Frisk, Päiväranta, Eikebrokk & Nurmi 2006; Ramakrishna & Lin 2002; Richardson & Zmud 2002); organisation’s attitude to IT (Earl 1996); and the main purpose of IT (Weiss, Thorogood & Clark 2006).

Earl (1989) developed an IT director's framework for all seasons based on the strategic IT roles grid developed by McFarlan et al. (1983). This framework acknowledged that IT leaders' roles differ across the four IT roles of an organisation which are: support tool; critical resource; means of transformation; and unclear. An empirical study of 168 senior IT executives in the healthcare sector in the USA revealed that CIO roles as business partner (strategist) and integrator were significantly more important to organisations that expressed a 'transform' vision of IT (Smaltz 2000). Results from a recent empirical study of 129 CIOs and senior business executives from China and Taiwan (Li et al. 2012) indicate that the strategic IT vision has a significant moderating effect on the relationship between CIO strategic roles' effectiveness and the innovative usage of IS. It is expected that the firms in early stages of the OLC (Existence and Survival) tend to view IT as either to automate or to informate-up, whereas firms in late stages of the OLC (Success and Renewal) tend to articulate high vision of IT (informate-down or transform). Therefore, the importance of the CIO supply side and demand side roles at each stage of the OLC would be affected by the vision that their firm adopts for the role of IT. Hence, the relevant literature suggests the following hypothesis:

*H6: The organisational strategic IT vision moderates the relationship between the OLC stages and the CIO roles*

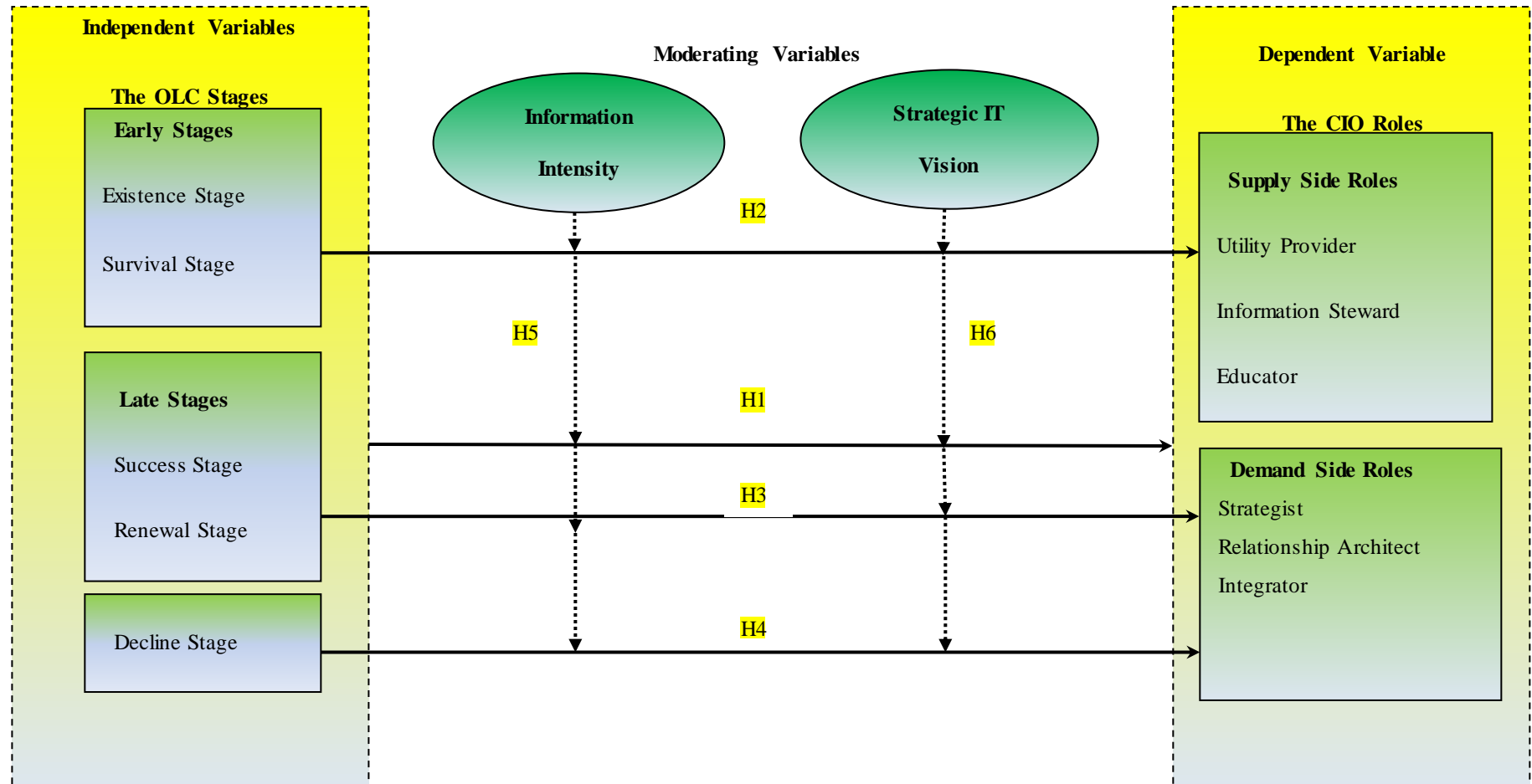
Figure 2.4 represents the research model that conceptualized the main research question and hypothesized relationships

## **2.4.5 Conclusion**

This chapter presented a review of the previous literature and identified the foundation underling the theoretical framework relevant to the research problem. Some gaps in the literature have been identified that relate particularly to the CIO role. Building upon that, this research develops a theoretical framework for approaching the research problem. Six research hypotheses were developed to guide the next steps of this research in terms of data collection and data analysis.



Figure 2.4 The Research Model





## **3 Research Methodology**

### **3.1 Introduction**

This study utilized a cross sectional survey design based on structural equation modelling (SEM) to assess the causal relationship between five OLC stages and six CIO roles in Australia. The aim of this chapter is to describe the methodology used to collect and analyse the data in order to test the research hypotheses. In this chapter the research design, method, instrumentation and procedures used in this PhD research will be presented. This chapter has been organized in the following way. First, this chapter begins with a justification of the research paradigm. Then a justification of how the data for this study are collected is provided. The third section of this chapter will discuss how the instruments used in the present study were developed and refined. Next, detailed information regarding the research procedures in terms of sampling, survey administration, data entry and data screening, and data analysis agenda are presented in the fourth section. After that, an explanation of how the ethical considerations of the methodology were addressed in this research is provided and a brief conclusion of this chapter will be drawn. The layout of this chapter follows the recommendation of Perry (2012) and Rudestam and Newton (2007).

### **3.2 Choice and Justification of the Research Paradigm**

The term paradigm refers to ‘the basic belief system or worldview that guides the investigator’ (Guba & Lincoln 1994). As such, the research paradigm will work as a controller that drives the research flow in terms of research method, data collection method, data analysis techniques, and then limits the conclusions that can be drawn from the research results. It can be identified that there are two main paradigms in the information systems (IS) field: positivism and interpretivism (Chen & Hirschheim 2004; Fitzgerald & Howcroft 1998a; Gregor 2006; Orlikowski &

Baroudi 1991; Weber 2004). Table 3.1 provides a comparison of these two main IS research paradigms.

Building upon the information depicted in Table 3.1 and from the ontological point of view, it is anticipated that the positivist paradigm is suitable for this study as it is concerned with the apprehensible reality (the nature of the relationship between the OLC stages and the CIO roles) which can objectively and independently exist from the experience of the sample units (the CIOs). This study aims to test a set of hypotheses related to the research problem that are formulated and modelled based on mature theories and seeks to deductively verify or confirm these theories using the scientific method. Hence the positivist paradigm can be justified from the epistemological perspective. The choice of a positivist paradigm for this research can be also justified methodologically as this research employs a set of objective measurements to quantitatively test the hypothesized relationships among the research constructs in a value-free position for the researcher.

This study adopted the quantitative positivist paradigm (QPP) for several reasons. First, this study is based on mature parent theories of organisation life cycle and managerial roles, therefore, the quantitative positivist paradigm will be best aligned with the aim of this research as it is seeking to confirm the impact of the organisational life cycle on the CIO role. Second, the quantitative positivist paradigm is confirmed as the most dominant paradigm in information systems research (Chen & Hirschheim 2004; Fitzgerald & Howcroft 1998a; Goles & Hirschheim 2000; Oates 2006; Orlikowski & Baroudi 1991; Straub, Gefen & Boudreau 2005). Furthermore, a quantitative positivist paradigm seeks generalizable results through the hypothetic-deductive testability of theories which support the research objective of gaining valid, reliable and generalizable results that can improve the effectiveness of senior Australian IT leaders. Moreover, the decision has been made to adopt the quantitative positivist paradigm with the consideration of the desire to involve a large number of CIOs Australia-wide in this study which would be unachievable with a qualitative interpretive paradigm.

Straub et al. (2005) and Bryman and Bell (2007) argue that the quantitative positivist paradigm provides a set of powerful, objective, and replicable statistical methods to

analyse numeric data to examine theories by estimating hypothesized coefficients and assessing their significance.

**Table 3.1 Comparison between two dominant IS research paradigms**

INTERPRETIVIST (Soft)	POSITIVIST (Hard)
No universal truth. Understand & interpret from researcher's own frame of reference. Uncommitted neutrality impossible. Realism of context important	Belief that world conforms to fixed laws of causation. Complexity can be tackled by reductionism. Emphasis on objectivity, measurement and repeatability.
ONTOLOGICAL LEVEL	
<b>Relativist</b> Belief that multiple realities exist as subjective constructions of the mind. Socially-transmitted terms direct how reality is perceived and this will vary across different languages and cultures.	<b>Realist</b> Belief that external world consists of pre-existing hard, tangible structures which exist independently of an Individual's cognition.
EPISTEMOLOGICAL LEVEL	
<b>Subjectivist</b> Distinction between the researcher and research situation is collapsed. Research findings emerge from the interaction between researcher and research situation, and the values and beliefs of the researcher are central mediators.	<b>Objectivist</b> Both possible and essential that the researcher remain detached from the research situation. Neutral observation of reality must take place in the absence of any contaminating values or biases on the part of the researcher.
<b>Emic/Insider/Subjective</b> Origins in anthropology. Research orientation centred on native/insider's view, with the latter viewed as the best judge of adequacy of research	<b>Etic/Outsider/Objective</b> Origins in anthropology. Research orientation of outside researcher who is seen as objective and the appropriate analyst of research
METHODOLOGICAL LEVEL	
<b>Qualitative</b> Determining what things exist rather than how many there are. Thick description. Less structured & more responsive to needs & nature of research situation	<b>Quantitative</b> Use of mathematical & statistical techniques to identify facts and causal relationships. Samples can be larger & more representative. Results can be generalized to larger populations within known limits of error
<b>Exploratory</b> Concerned with discovering patterns in research data, & to explain/understand them. Lays basic descriptive foundation. May lead to <i>generation</i> of hypotheses	<b>Confirmatory</b> Concerned with hypothesis testing & theory verification. Tends to follow positivist, quantitative modes of research
<b>Induction</b> Begins with specific instances which are used to arrive at overall generalizations which can be expected on the balance of probability. New evidence may cause conclusions to be revised. Criticized by many philosophers of science, but plays an important role in theory/hypothesis conception.	<b>Deduction</b> Uses general results to ascribe properties to specific instances. An argument is valid if it is impossible for the conclusions to be false if the premises are true. Associated with theory verification/falsification & hypothesis testing
<b>Field</b> Emphasis on realism of context in natural situation, but precision in control of variables & behaviour measurement cannot be achieved	<b>Laboratory</b> Precise measurement & control of variables, but at expense of naturalness of situation, since real-world intensity & variation may not be achievable
<b>Idiographic</b> Individual-centred perspective which uses naturalistic contexts & qualitative methods to recognize unique experience of the subject	<b>Nomothetic</b> Group-centred perspective using controlled environments & quantitative methods to establish general laws
AXIOLOGICAL LEVEL	
<b>Relevance</b> External validity of actual research question & its relevance to practice vital, rather than constraining the focus to that researchable by 'rigorous' methods	<b>Rigour</b> Research characterized by hypothetico-deductive testing according to the positivist paradigm, with emphasis on internal validity through tight experimental control and quantitative techniques

Source: (Fitzgerald & Howcroft 1998b, p. 320)

### 3.3 Choice and Justification of Data Collection Method

This research employed a survey strategy of inquiry to collect data required to answer the research questions and test the research hypotheses. The term *survey*

refers to ‘the selection of a relatively large sample of people from a pre-determined population of interest’ (Kelley, Clark, Brown & Sitzia 2003). Babbie (1990) and Secaran (2000) identified two types of surveys in terms of data collection time: cross sectional survey with the data collected at one point of time—though it might last for weeks or even months; and longitudinal survey with data collected over an extended period of time, often in years, to monitor the changes in dependent variable(s). As far as the survey type is concerned, this study used a cross sectional survey as the intended data was collected at one point of time.

Over time the survey methodology has been the most widely used method in the IS field (Chen & Hirschheim 2004; Lending & Wetherbe 1992; Lucas Jr 1989; Palvia, Leary, Mao, Midha, Pinjani & Salam 2004; Palvia, Pinjani & Sibley 2007; Pinsoneault & Kraemer 1993; Vogel & Wetherbe 1984). Newsted, Huff and Munro (1998) argued that surveys are among the more widely used methods in IS because they:

- ❖ are easy to administer and simple to score and code;
- ❖ allow the researcher to determine the values and relations and constructs;
- ❖ provide responses that can be generalized to other members of the population studied and often to other similar populations;
- ❖ can be reused easily and provide an objective way of comparing responses over different groups, time, and places;
- ❖ can be used to predict behaviour;
- ❖ permit theoretical propositions to be tested in an objective fashion; and
- ❖ help confirm and quantify the findings of qualitative research.

Within the survey methodology, research methodologists have identified four main types: mail (postal) survey, personal (face-to-face) survey; telephone survey; and web-based (electronic or online) survey (Jones, Baxter & Khanduja 2013; Kelley et al. 2003; Lucas, Hair, Bush & Ortinau 2004; Malhorta, Hall, Shaw & Oppenheim 2002; Secaran 2000; Watson 1998; Zikmund 2003). Lucas et al. (2004) argued that to produce usable data in as short a time as possible at the lowest cost, researchers must consider the competing and frequently contradictory objectives of budget, time, and data quality in choosing the right method to collect their data. Similarly, it has been argued that “no single method can be judged superior to the others in the

abstract, instead, each should be evaluated in terms of a specific study topic and population, as well as budget, staff, and time constraints” (Salant & Dillman 1994, p. 33). Therefore, in order to choose one method from the four methods identified earlier that fits best with conducting a large scale survey (Australia wide) with a population that involves senior IT executives, the researcher conducted a comparison among them based on the criteria presented in Table 3.2.

**Table 3.2 A comparisons of four survey methods identified in literature**

Criteria	Personal Survey	Telephone Survey	Mail Survey	E-Survey
Time	Very Long	Long	Short	Shorter
Cost	Very High	High	Low	Lower
Staff	Large	Low	Moderate	Lower
Response Rate expected	High	High	Moderate	Low
Data Quality	Higher Quality	High	Reasonable	Reasonable
Other Logistic Requirements	Require the availability of postal addresses; communication skilled staff	Require the availability of a directory of phone numbers; short questionnaire with few options; communication skilled staff; respondents owned phones	Require the availability of postal addresses; and educated respondents	Require the availability of email addresses; respondents' computer self-efficacy
Decision	Excluded as it is not applicable with large scale survey in terms of cost and time	Excluded as it is requiring long time period and hiring and training staff on communication skills	Chosen as it fits with the situational characteristics of this study	Excluded due to unavailability of the Australian CIOs' email addresses

Source: Developed for this study based on Salant and Dillman (1994); Jones et al. (2013); Lucas et al. (2004); and Malhorta et al. (2002)

In brief, this study adopted a cross sectional postal survey method as a main data collection method as it fitted with the situational characteristics of this research in terms of time, cost, and the specificity of its population.



### 3.4 Constructing the Research Questionnaire

Researchers in quantitative positivist research must pay considerable attention to measurement if they wish to obtain trustworthy results (Straub et al. 2005). To quantify the main sets of research variables and considering the time limitation of this study, four previously developed measures are identified and used (see Appendix A). Bourque and Fielder (1995) pointed out that instruments taken from previous literature have the advantage of prior development and testing. Consequently, the validity and reliability of the instruments used in this research has been previously established. An effort has been made to make the research questionnaire as short as possible to gain a sufficient response rate. The four measures used in this study are outlined below.

#### 3.4.1 Identification of Chief Information Officer Role

The extensive literature review of the role of CIOs suggested that there are at least six survey instruments that have been used to identify the CIOs' role to date. The first unpublished survey instrument was developed by Arthur Andersen & Co (1986, 1988) and utilized by Applegate and Elam (1992) and Passino Jr and Severance (1988). The second one was the survey instrument proposed by McCall and Segrist (1980) which operationalized Mintzberg's (1973) ten managerial roles. This survey instrument was used by Grover et al. (1993) to identify the CIOs roles. Seven years later, Gottschalk (2000d) presented and validated the third survey instrument by consolidating the McCall and Segrist (1980) survey instrument with six other CIO roles suggested by British Computer Sciences Corporation (CSC 1996). This survey instrument has been utilized by a number of researchers such as Lineman (2006); Gottschalk (2000a); and Milliron (2008). The fourth instrument was proposed by Karimi et al. (1996b) and included eight questions based on the eight attributes of successful IT leaders established by Rockart et al. (1982). The fifth instrument presented by Smaltz et al. (2006) is based a comprehensive set of CIO roles identified from the literature. Recently, Wu et al. (2008) presented another CIO role instrument based on selected CIO literature. Table 3.3 summarizes these six CIO role instruments identified from the literature.

**Table 3.3 Summary of the main CIO role identification instrument identified in the literature**

Reference	Number of Roles identified	Number of Items	Type*	Based on
(Arthur Andersen & Co 1986, 1988)	2	22; 16	Specific	(Mautz, Merten & Severance 1983)
(McCall & Segrist 1980)	10	46	General	(Mintzberg 1973)
(Gottschalk 2000d)	12	52	General & Specific	(CSC 1996; McCall & Segrist 1980)
(Karimi et al. 1996b)	8	8	Specific	(Rockart et al. 1982)
(Smaltz et al. 2006)	6	25	Specific	Comprehensive roles inventory identified from prior literature + interviews with three CIOs and three TMT members (Smaltz 1998, 1999)
(Wu et al. 2008)	8	34	Specific	(Feeny & Willcocks 1998; Grover et al. 1993; Ross & Feeny 1999; Smaltz et al. 2006; Willcocks et al. 2006)

\* Specific = for CIOs; General = for all managers

Source: Developed for this study

Based on a coherent comparison among the six CIOs' role identification instruments, a decision has been made to adopt the instrument developed by Smaltz et al. (2006) for several reasons. Firstly, this instrument has demonstrated high validity and reliability (Chen & Wu 2011; Li et al. 2012; Wu et al. 2008). Secondly, this instrument is concise yet comprehensive, which is crucial as the targeted survey respondent is the most senior IT executive in the organisation, is extremely busy, over surveyed and unlikely to fill out a lengthy survey. Furthermore, this instrument was developed based on a wide base of knowledge regarding the CIO role integrated from a comprehensive CIO role inventory identified from literature along with rich data extracted from CIOs and top management team (TMT) members interviewed.

This scale developed by Smaltz et al. (2006) was used to identify the perceived importance of six key CIO roles proposed as Strategist, Integrator, Relationship Architect, Educator, Utility Provider and Information Steward. It is worth noting that these six roles have been classified by Smaltz et al. (2006) into two groups as follows:

- ❖ Supply side roles: which include the roles best described as operational or technical role for the CIO as utility provider, information steward, and educator; and
- ❖ Demand side roles: which include the roles best described as strategic or business roles for the CIO as integrator, relationship architect and strategist.

### 3.4.2 Organisational Life Cycle Measures

An extensive review of the organisational life cycle literature shows that several methodologies have been used to identify the OLC stage in empirical OLC studies (see Table 2.). The most common methodology used by a large number of previous empirical studies to determine the firm's current stage of the OLC from the perspective of their owners/managers regarding some distinctive organisational factors is a survey methodology (Hanks et al. 1993; Hanks 1990; Hanks & Chandler 1994; Kazanjian & Drazin 1989; Lester et al. 2003; Masurel & van Montfort 2006; Shirokova 2009; Smith et al. 1985). The second most common method used is financial indices such as sales growth, dividend, the ratio of retained earnings to equity (RE/TA) and the total assets (RE/TA), cash flows, and capital expenditure which can be extracted from the financial statements or annual reports of firms as secondary data. This method is commonly used in financial and accounting studies (Anthony & Joseph 1992; DeAngelo, DeAngelo & Stulz 2006; Dickinson 2011; Owen & Yawson 2010). The third most common is the longitudinal approach, which is a research technique that involves repeated observations of the same organisational variables such as age, size, structure, strategy and so forth over long periods of time to identify the stage of the OLC for these firms (Miller & Friesen 1983, 1984; Teeter & Whelan-Berry 2008). Another stream of qualitative studies used other methodologies including interviews (Beverland & Lockshin 2001; Kazanjian 1988); focus groups (Eggers et al. 1994); and case studies (Beverland & Lockshin 2001; Chandler 1962; Stam 2009) to identify the stage of the OLC for firms.

Following the majority of prior OLC studies which used a survey methodology, and in line with the positivist research paradigm chosen to guide the research process, this study adopted an existing 20 item OLC survey instrument developed by Lester et al. (2003). This survey instrument can be used to categorize organisations into five life cycle stages based on managers' perceptions. Four major variables are employed

in this scale (organisational situation, decision making style and information processing, organisational structure, and organisation size) to identify the stage of the OLC. Four items for each stage are used to cluster the firms into one of five life cycles (existence, survival, success, renewal, and decline) based on the CIO's perceptions about their firms. There are several pertinent reasons for using this OLC survey instrument for this study. Firstly, it has been successfully operationalized by a number of prior studies in different contexts, including Australia (Beuren et al. 2012; Lester & Parnell 2005; Lester & Parnell 2008a, 2008b; Perenyi, Selvarajah & Muthaly 2007, 2008, 2010; Perenyi et al. 2011a; Wang 2007). This instrument has demonstrated satisfactory validity and reliability. Furthermore, it is a concise survey instrument—and that is crucial due to the research population consisting of busy senior IT executives. Moreover, this survey instrument is robust and generalizable, so it is relevant for all types of organisations (Lester et al. 2003). Therefore, it can be used to identify the OLC stage for different size firms from different industries, which is crucial for this study as the targeted population included different size organisations from different industries.

### **3.4.3 Moderating Variables Measures**

This study also investigates whether the relationship between the OLC stages and the CIO role is moderated by organisational information intensity and its vision of IT. The two moderating variables are measured as follows.

#### **3.4.3.1 The Organisational Information Intensity**

In the absence of a valid and reliable scale for the information intensity, Wynne (1989) urged IS researchers to develop a usable set of metrics for results-oriented measurement of information intensity. Consequently, a number of scholars attempted to develop different sets of items that can properly measure the information intensity of the firm. Based on some information intensity indicators mentioned in Busch et al. (1991) and Porter and Millar (1985), Teo (1994) and Teo and King (1997) have developed and operationalized two sets of items to measure the information intensity for the product and for the value chain. Tong and Yap (1995) developed and employed another multi-item scale for information intensity to investigate the differences between high and low information intensity firms. Recently, Chandra and

Calderon (2009) developed and utilized a new instrument to measure business information intensity.

This current research adopted the scale proposed by Teo (1994) and Teo and King (1997) which contains four items that reflect the four dimensions of the information intensity of the value chain (information accuracy, frequency of update, the magnitude and extent of information employed). This scale was chosen because it has been confirmed by several studies such as Kearns and Lederer (2004); Kearns and Lederer (2003); Slone (2006); and Teo and King (1997) as a valid and reliable scale. This information intensity scale is the most widely used scale in the previous literature in comparison to other scales developed.

#### **3.4.3.2 The Strategic IT Vision**

The literature revealed three instruments which have been used for the measurement of the strategic IT vision of an organisation (Feeny et al. 1992; Ramakrishna & Lin 2002; Subramanian & Nosek 1993). Following Armstrong and Sambamurthy (1999); Smaltz (1999, 2000); and Smaltz et al. (2006), this research has adopted the strategic IT vision scale developed by Feeny et al. (1992) based on Schein's (1992) typology of IT visions. This scale is categorical and gives the respondents four brief statements that describe four visions of the role of IT in an organisation (automate informate-down, informate-up, and transform). The respondents are asked to choose one option that best describes their firm's vision of IT.

#### **3.4.4 Demographic information**

The last section of the questionnaire included some demographic information regarding the respondents and their firms. Seven personal (CIO characteristics) and four organisational variables were chosen based on the CIO literature in order to describe the research sample and to support the research results when appropriate. Table 3.4 summarises personal and organisational demographic variables.

**Table 3.4 Demographic variables included in the research questionnaire**

<b>CIO Characteristics Variables</b>	<b>Organisation Demographic Variables</b>
CIO Reporting Structure	Organisation Primary Industry
CIO Age	The Organisational Geographic location ( State)
CIO Gender	Organisational Size
CIO Education Level	Organisational Age
CIO Job Title	
CIO years in IT Profession	
CIO years in Position	

Details regarding the different sections of the research questionnaire and sources of the measurement items are provided in Table 3.5.

**Table 3.5 Outline of the constructs, type, scale and study source included in research questionnaire**

Section	Construct	Type	Scale Type	Sub Scales Included	Number of Items	Reference
1	CIO Roles	Dependent	Continuous (Seven Points Likert Scale*)	Strategist Role Relationship Architect Role Integrator Role Educator Role Information Steward Role Utility Provider Role <b>Total</b>	6 4 4 3 4 4 <b>25</b>	(Smaltz et al. 2006)
2	Organisational Life Cycle Stages	Independent	Continuous (Seven Points Likert Scale*)	Existence Stage Survival Stage Success Stage Renewal Stage Decline Stage <b>Total</b>	4 4 4 4 4 <b>20</b>	(Lester et al. 2003)
3	Organisational Strategic IT Vision	Moderator	Continuous (Seven Points Likert Scale*)	To Automate To Informate-Up To Informate-Down To Transform Total	1 1 1 1 4	(Schein 1992)
3	Organisational Information Intensity	Moderator	Continuous (Seven Points Likert Scale*)	Information Accuracy Information Frequency Update Magnitude of information employed Extent of information employed <b>Total</b>	1 1 1 1 <b>4</b>	(Teo 1994; Teo & King 1997)
5	Demographics	Descriptive	Categorical	-	-	(Grover et al. 1993; Hanks 1990; Iyengar 2008)

Source: Developed for this study The original survey of the first three variables was five point Likert scales; however this study will adopt seven points Likert scale for the sake of increased questionnaire reliability (Alwin & Krosnick 1991)

### 3.4.5 Pre-test and Pilot Test of the Research Questionnaire

Having established the initial draft of the research questionnaire, two central steps were conducted to refine it prior to conducting the final survey: pretesting and pilot survey. A pre-test is a small-scale implementation of the draft that assesses three critical factors (Rea & Parker 2005):

- ❖ Questionnaire clarity: will respondents understand the questions?;
- ❖ Questionnaire comprehensiveness: are the questions and response choices sufficiently comprehensive to cover a reasonably complete range of alternatives?; and
- ❖ Questionnaire acceptability: potential problems such as excessive questionnaire length or questions that are perceived to invade the respondents' privacy or abridge ethical or moral standards that must be addressed before the final survey commences.

Babbie (2004) argued that 'no matter how carefully researchers design a data collection instrument such as a questionnaire, there is always the possibility—indeed the certainty—of error'. To avoid any errors 'that were not anticipated', an initial draft was sent to six academic staff members from the University of Southern Queensland (three from the IS School and three from the Marketing & Management School) to check the three critical issues identified earlier as the four scales included in this research survey were developed in a different context. Some minor changes were made to some items (*e*, *j*, *l*, and *m* in section 1 Appendix A) in terms of the wording in light of the expert panel's valuable feedback.

Next, a pilot survey of the refined questionnaire was sent to individuals who are similar to the targeted survey population. The pilot survey is considered a replica and rehearsal of the main survey (Kothari 2004) and allows the researcher to identify whether respondents understand the questions and instructions, and whether the meaning of questions is the same for all respondents (Kelley et al. 2003) and, subsequently, eliminate any possible weaknesses regarding question wording, sequence, layout, familiarity with respondents, questionnaire completion time, analysis process and so forth (Ticehurst & Veal 2000). To do so, one former



healthcare CIO and the CIO of the University of Southern Queensland were asked to complete the pilot survey and comment on any issue that might impair completion of the questionnaire or generate a poor response. The experts' comments were very helpful and minor changes in one item (item *d* section 1 Appendix A) in terms of its wording were incorporated to finalize the research questionnaire for data collection. The final research questionnaire can be seen in Appendix A.

## **3.5 Procedures for Data Collection and Analysis**

### **3.5.1 Selection of Research Sample**

Once the decision to use the survey method was made and the research questionnaire developed, the next step involved selecting the research sample. Following Zikmund's (2003) recommendations, a series of sequential decisions need to be made before a sample is obtained. Firstly, the targeted population needs to be specified. In that regard, the target population for this research was Australian private sector senior IT executives regardless of their job title and the industry they work within. Second, with the absence of a complete list of the targeted population of this research, the sample frame from which the sample will be drawn should be found. A list of postal address of 954 senior IT executives in Australian private sector firms was purchased from Dun & Bradstreet Australia (2011) which provided the sampling frame or the working population for this research (Zikmund 2003). This commercial sampling frame was the best one available as it was generated by the Australian branch of one of the biggest database marketing companies worldwide. The initial list was carefully checked and all irrelevant job titles to the research project and all duplicated names were removed. As the working population of this research was relatively small (954 CIOs), a decision was made to send the questionnaire to all 954 CIOs to ensure a sufficiently large data set for analysis. The present study aims firstly to cluster the CIOs firms into five OLC stages then examine the relationship between each of them and the six CIO roles within five basic models using component-based structural equation modelling (e.g. PLS/SEM). In light of these data analysis constraints, the approximation of the sample size should consider some rules of thumb mentioned in the literature in that regard. Roscoe (1975) pointed out that in a situation where the sample needs to be split into sub-samples, a minimum

sample size of 30 cases for each category is appropriate. As such, the minimum sample size required to be representative for this study is 150 (i.e., 5 OLC stages x 30 =150). In terms of the PLS sample size requirement, Chin (1998b) and Chin and Newsted (1999) suggested a sample size of 10 times the largest of two possibilities: (1) the block with the largest number of formative indicators (i.e., largest measurement equation) or (2) the dependent latent variable with the largest number of independent latent variables impacting it (i.e., largest structural equation). Each of the five basic PLS models tested in the present study included seven reflective variables with 29 indicators. The greater measurement equation in these models was represented by the strategist role construct with 6 indicators; therefore, the required sample size is 60 cases. However, Chin and Newsted (1999) found through a Monte Carlo simulation study that PLS approach can provide information about the appropriateness of indicators with sample sizes as low as 20 cases (Henseler, Ringle & Sinkovics 2009). Therefore, an overall sample size range from 100-300 and a sub-sample for each stage of the OLC ranging from 20-60 would be considered sufficient to test the hypotheses of this study.

### **3.5.2 Survey Administration**

Data for this research were collected through a large-scale mail survey carried out in Australia in early 2012. The survey was administrated in three waves: two postal mail outs followed by online email. A cover letter along with a copy of the questionnaire and pre-paid reply envelope was sent to all Australian senior IT executives listed in the sampling frame used in this study in late February 2012 for the first mail out and in late March 2012 for the second mail out. To increase the response rate, follow-up phone calls were conducted in early July 2012 to motivate more responses after the second mail out. As a result of these phone calls, the IT leaders willing to respond were asked to provide the researcher with their personal email in order to send a link to an online version of the survey via the internet as they tended to find the online survey more convenient. Next, emails were sent to all IT leaders who had expressed their willingness to participate. These emails carried an URL link to the online survey developed using the Qualtrics online survey software. The survey instruments and the cover letters for the three mail outs can be seen in Appendix A. Details of the outcome of these two postal mail outs, along with the

third online mail out, and a profile of the survey respondents are provided in chapter 4 (data analysis).

### **3.5.3 Data Entry, Data Screening, and Data Cleaning**

Every questionnaire received was checked for completeness before data entry. A decision was made to exclude any questionnaire that had more than 10 per cent missing data on key research variables from the analysis. The acceptable questionnaires were counted and their data coded and entered into a computer accordingly. Data collected for this study were manually entered into the computer program SPSS IBM 19 for Windows, while the field work was still underway.

Due to the manual data entry, some steps were taken to screen and clean the data from any possible errors that might distort statistical results (Pallant 2007; Tabachnick & Fidell 2007). Firstly, the researcher checked the entered data twice by eyesight and the data entry errors detected were corrected. Next, frequencies for all research variables were inspected using SPSS in order to ensure that all responses fall within the range of possible values. Some other errors were discovered from this step and corrected. To ensure an error-free data set, the frequencies for all variables were checked again to confirm that errors had been corrected.

Having corrected the data entry errors, a treatment of the missing data was conducted using Expectation-Maximization (EM) method (Tabachnick & Fidell 2007). Once the missing data were addressed, a preliminary data analysis was conducted representing some numerical descriptive statistics such as frequencies, means, standard deviation, minimum, maximum, skewness, kurtoses, and collinearity and some addition graphical descriptive statistics such as Boxplots, Q-Q plots, and Histogram. The descriptive statistics provide valuable information regarding respondents and their firm's profile in terms of demographics; in addition to information related to research variables such as data normality, outliers and multicollinearity. Examining the skewness, kurtoses, using Histograms, and Boxplots revealed that the distribution of some items exceeded the acceptable threshold of normal data. Accordingly, the data of these non-normal items have been transformed following recommendations suggested by Tabachnick and Fidell (2007). As far as the outliers are concerned, the Boxplots and the standardized scores for the items of

all research variables indicate no extreme outliers that extended more than 3 box lengths from the edge of the box (Pallant 2007) or have  $z$ -scores above  $\pm 3$ . Multicollinearity was checked by conducting a multiple regression procedure with collinearity diagnostic option among the five independent variables (the five OLC stages). The results indicate no multicollinearity issue for all independent variables as the variance inflation factors (VIF) for them are below 2 and all tolerance figures are over 0.5, which is within the acceptable collinearity threshold of 10 for the VIF and 0.1 for tolerance (Hair, Black, Babin, Anderson & Tatham 2006; Pallant 2007).

### **3.5.4 Data Analysis Agenda**

The following statistical analysis was mainly based on structural equation modelling (SEM). SEM is a second generation multivariate technique (Chin 1998b) that can be used to replace many conventional analytical tools such as factor analysis, path analysis and regression analysis (Holmes-Smith 2010). This statistical technique has a capability to use factor analysis to create factors (also referred to as latent variables) from their multiple observed variables (also called manifest variables ) and then combine this with path analysis (complex regression models) simultaneously assessing causal relationships amongst the factors in a systematic and comprehensive manner (Gefen, Straub & Boudreau 2000; Holmes-Smith 2010).

There are three main reasons that justify the adoption of the SEM in this study. First, from the epistemological point of view, this research—as explained earlier—has adopted the positivist paradigm, so that use of the SEM statistical technique is considered an appropriate data analysis technique (Urbach & Ahlemann 2010). Furthermore, the nature of the research question of this study and the multiple hypothesized relationships amongst the research constructs also support using SEM. Moreover, SEM has become one of the most common statistical techniques used in the IS field (Gefen, Rigdon & Straub 2011a; Gefen et al. 2000; Urbach & Ahlemann 2010).

Under the umbrella of the SEM there are two types of analysis: covariance-based approach (CBSEM) and variance-based approach (PLS) (also referred to as component-based approach). Table 3.6 provides a comparison between these two SEM approaches.

**Table 3.6 Comparison of PLS and CBSEM**

<b>Criterion</b>	<b>PLS</b>	<b>CBSEM</b>
Objective	Prediction oriented	Parameter oriented
Approach	Variance based	Covariance based
Assumption	Predictor specification (nonparametric)	Typically multivariate normal distribution and independent observations (parametric)
Parameter estimates	Consistent as indicators and sample size increase (i.e., consistency at large)	Consistent
Latent variable scores	Explicitly estimated	Indeterminate
Epistemic relationship between a latent variable and its measures	Can be modelled in either formative or reflective mode	Typically only with reflective indicators
Implications	Optimal for prediction accuracy	Optimal for parameter accuracy
Model complexity	Large complexity (e.g., 100 constructs and 1000 indicators)	Small to moderate complexity (e.g., less than 100 indicators)
Sample size	Power analysis based on the portion of the model with the largest number of predictors. Minimal recommendations range from 30 to 100 cases	Ideally based on power analysis of specific model – minimal recommendations range from 200 to 800

Source: Chin & Newsted (1999)

The present study aims to examine the causal relationship between the five stages of the OLC as the independent variable and six CIO roles as the dependent variables. To do so, the data set of this study is split into five groups according to the five OLC stages, creating five small subsamples. A decision has been made to adopt a PLS approach for three main reasons. Firstly, PLS is a predictive-oriented technique that allows researchers to test causal relationships in situations of high complexity and low theoretical information (Joreskog & Wold 1982). Furthermore, PLS provides a realistic alternative as it avoids some restrictive assumptions imposed by CBSEM such as data distribution and model identification (Henseler et al. 2009). Moreover, PLS is more robust with small sample sizes in comparison to CBSEM (Chin 1998a, 1998b; Hair, Ringle & Sarstedt 2011; Henseler et al. 2009; Hulland 1999; Reinartz, Haenlein & Henseler 2009).

PLS Graph Alpha Version 03.12 build 01 (Chin & Frye 2003) software and its user manual (Chin 2001) were used to analyse the data. In order to test the research

hypotheses stagewise, the present study has analysed the data in three major steps as follows.

#### **3.5.4.1 Measurement Model Evaluation**

The measurement (outer) model was tested first to ensure the constructs demonstrated adequate reliability and validity based on the overall data set. All variables included in the main model (without interaction) of this research have been modelled as reflective constructs, hence, five major areas should be tested to ensure measurement validity and reliability (Henseler et al. 2009): reliability at the construct level; reliability at the indicators level; convergent validity; discriminant validity at the construct level; and discriminant validity at the indicators level.

#### **3.5.4.2 Clustering Firms**

Having established the constructs' validity and reliability, the next step was to categorize the CIO's firm into the five stages of the OLC. Literature presented in Table 2.2 regarding the key OLC models revealed at least three different methods that have been used to categorize firms into OLC stages. The most common method is cluster analysis, which is used by a number of researchers such as Perenyi, Selvarajah & Muthaly (2008, 2010, 2011a); Hanks (1990); Hanks et al. (1993); Lester et al. (2003); Hanks and Chandler (1994); and Smith et al. (1985). The participants' self-categorization of their firms was the second most common method to classify firms according to stages of the OLC used by researchers such as Masurel and van Montfort (2006); Kazanjian (1988); Eggers et al. (1994). Only one study was found where the researchers self-categorized the firms investigated (Dodge & Robbins 1992)

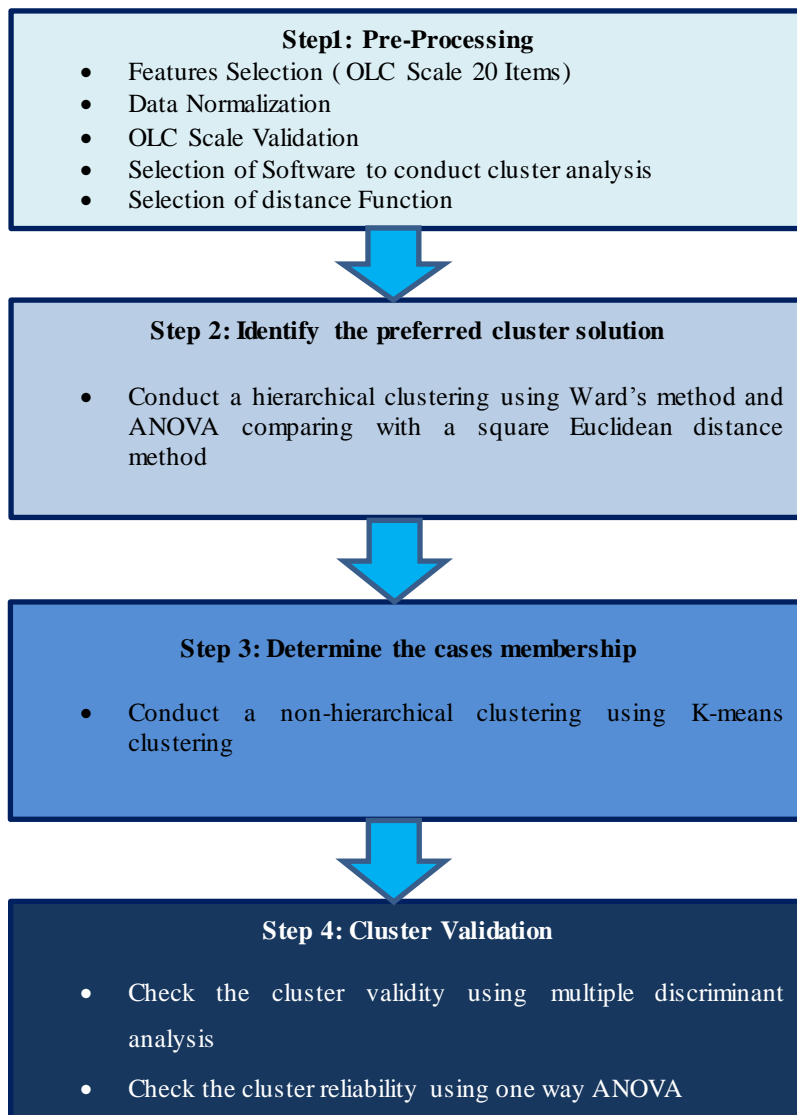
Following in the footsteps of prior OLC literature such as Perenyi, Selvarajah and Muthaly (2008, 2010, 2011a); Hanks (1990); Hanks et al. (1993); Lester et al. (2003); Hanks and Chandler (1994); and Smith et al. (1985), cluster analysis was used to categorise the firms into five stages of the OLC.

This study used cluster analysis to categorize organisations according to the OLC stages for two main reasons. First, it is evident that cluster analysis is the most commonly used taxonomic tool by prior OLC researchers. Second, it aligns with the

positivist paradigm adopted in this study which emphasizes the use of scientific, quantitative and objective methods that avoid any bias and put the researcher in the position of value-free from the analysis outcome.

Cluster analysis is an exploratory technique that seeks to classify cases such that there will be as much likeness among the cases within each cluster (homogeneity) and as much difference (heterogeneity) to cases in the other clusters (Lucas et al. 2004). Hair et al. (2006) and Mooi and Sarstedt (2011) encouraged researchers to apply a combination approach to clustering using a hierarchical approach followed by a non-hierarchical approach. Data of this study were clustered using two step clustering in order to categorize the CIOs' firms into the five OLC stages. Therefore, hierarchical cluster analysis has been used first, based on OLC scale indicators to identify the preferred cluster solution. Then a non-hierarchical (K-means) cluster analysis was conducted to determine the case membership across clusters. IBM SPSS statistics version 19 for Windows was used to perform the analysis. The recommendations proposed by Clatworthy, Buick, Hankins, Weinman and Horne (2005) were followed in reporting the cluster analysis results. Figure 3.1 illustrates clustering process steps.

**Figure 3.1 Clustering Approach Steps**



### 3.5.4.3 Evaluation of Structural Models and Hypotheses Testing

The third step was to examine the structural model for each stage individually, once without the interaction effect of the strategic IT vision and the information intensity and another with it. Research hypotheses were tested based on path coefficient estimates. To test the statistical significance of the path coefficients a bootstrapping approach (Efron & Tibshirani 1993) was performed to generate 200 random samples from the original data set. The PLS model goodness of fit (GoF) can be determined by examining  $R^2$  values for the dependent (endogenous) variables (Hulland 1999),



along with the global GoF proposed by Tenenhaus, Amato and Esposito Vinzi (2004). The new product approach developed by Chin, Marcolin and Newsted (2003) was used to examine the interaction effect of the two moderating variables (the strategic IT vision and the information intensity).

To sum up, this research has used a number of different statistical techniques to analyze the research data in order to test the research hypotheses. Table 3.7 summarizes these statistical techniques and the purpose of each of them; along with some relevant references that guided the statistical analysis of this research.

**Table 3.7 Summary of statistical techniques used in this research**

	<b>Required Analysis</b>	<b>Analytical Method</b>	<b>Software used</b>	<b>Purpose for use</b>	<b>Reference</b>
1	Code Data	Variable coding	SPSS IBM 19	Define and label each item and assign numbers to each of the possible responses	(Pallant 2007)
2	Missing Data	Expectation maximization (EM) with Little's MCAR test	SPSS IBM 19	Treatment of missing data	(Tabachnick & Fidell 2007)
3	Detect outliers	Descriptive statistics (Minimum & Maximum; Q Box)	SPSS IBM 19	Detect and treat outliers	(Hair et al. 2006; Pallant 2007)
4	Data Normality test	Descriptive statistics (Histogram, Normality curve, Skewness and kurtoses)	SPSS IBM 19	Examine items normality	(Hair et al. 2006; Tabachnick & Fidell 2007)
5	Data Transformation	Data Transformation Algorithms	SPSS IBM 19	Normalize non normal items	(Tabachnick & Fidell 2007)
6	Non-Response Bias	Mann-Whitney U test	SPSS IBM 19	Ensure that early and late responses are similar	(Armstrong & Overton 1977; Pallant 2007; Sivo, Saunders, Chang & Jiang 2006)
7	Demographics	Descriptive statistics (Mean, Standard Deviation, Percentages)	SPSS IBM 19	Describe the profile of respondents and their firms	N.A
8	Check the measurement model	Structural Equation Modelling (SEM) /Partial Least Square (PLS):(Composite Reliability(CR), Average Variance Extracted (AVE), Square Root of the AVE, Factor Loadings and Cross Loadings, correlation matrix	PLS Graph-alpha Version 03.12 Build 01	Check items and constructs for reliability, convergent validity, discriminant validity	(Chin 1998a, 1998b, 2010; Gefen & Straub 2005; Henseler et al. 2009; Hulland 1999)
9	Clustering	Cluster Analysis	SPSS IBM 19	Classify CIO's firms into the OLC stages	(Clatworthy et al. 2005; Hair et al. 2006; Malhorta et al. 2002)
9	Test the structural model without interaction effect	SEM/PLS : Path Coefficients (Beta); R <sup>2</sup> , T test	PLS Graph-alpha Version 03.12 Build 01	Examine the relationship between dependent (the CIO roles) and independent variable (the OLC Stages)	(Chin 1998a, 1998b, 2010; Henseler et al. 2009)
10	Test the structural model with the interaction effect	SEM/PLS product-indicator approach : Path Coefficients (Beta); R <sup>2</sup> , T test	PLS Graph-alpha Version 03.12 Build 01	Measuring interaction effects of moderating variables (Strategic IT vision and Information Intensity)	(Chin et al. 2003; Henseler & Chin 2010; Henseler & Fassott 2010); (Carte & Russell 2003)

Source: Developed for this study

### 3.6 Research Ethical Considerations

Ethical dimensions should be considered in IS research (Davison 2005). Researchers should adhere to a code of ethical research that ensures the confidentiality of the data gathered and respect for the participants' privacy and anonymity (Nardi 2006; Zikmund 2003). These two dimensions should receive considerable attention from researchers in two areas: data collection and data analysis (Creswell 2003; Nardi 2006). Table 3.8 shows ethical issues that can arise during these two activities.

**Table 3.8 Ethical Issues considered in data collection and data analysis**

Ethical issues during data collection	Ethical issues during data analysis
<ul style="list-style-type: none"> <li>❖ Respect the participants rights: not to participate to withdraw to give informed consent to anonymity to confidentiality</li> <li>❖ Ensure that the participants suffer no adverse consequences-physiological, psychological, social , political or economic</li> <li>❖ Fairness in distribution the survey so that no particular group of people is systematically denied</li> </ul>	<ul style="list-style-type: none"> <li>❖ Protect the anonymity of participants, roles, and incidents in the project.</li> <li>❖ Keep data gathered for a reasonable period of time then discard it so that it does not fall into the hands of others who could abuse it.</li> <li>❖ Ensure accurate interpretations of the results</li> <li>❖ Ensure not to share the data with individuals not involved in the project</li> <li>❖ Ensure that the results are used only for their stated purpose and not utilized in a manner to which the respondents would object</li> </ul>

Source: Developed for this study (based on Creswell 2003; Nardi 2006; Oates 2006; Secaran 2000; Zikmund 2003)

Due to the involvement of human beings and organisations in this research, the USQ procedures for conducting ethical research were followed. In pursuance of these procedures, all information collected in the survey will be kept strictly confidential and stored securely for the required five years. USQ ethics clearance for this study was obtained from the University of Southern Queensland Ethics Committee before data collection commenced (see Appendix B). Accordingly, the author and his supervisors are responsible for ensuring this study is conducted in an ethical and trustworthy manner.

### **3.7 Conclusion**

Building upon the positivist research paradigm, this study used a cross sectional survey design to collect data regarding the Australian CIO and their firms in order to address the research questions and test the research hypotheses. This chapter described the research paradigm chosen and the methodological approach of this study and steps conducted and procedures taken to achieve the aim of this research in investigating the Australian CIO role across the organisational life cycle stages. Throughout this chapter five central topics were discussed as follows: (1) selection and justification of the research paradigm; (2) selection and justification of data collection method; (3) instrumentation; (4) procedures for data collection and data analysis; (5) and, finally, ethical considerations. In the next chapter the research hypotheses and the research questions will be addressed by the results obtained from the statistical data analysis.

## 4 Data Analysis

### 4.1 Introduction

The aim of this chapter is to analyse the empirical data collected in this research in order to test the research hypotheses and answer the three general research questions. This chapter has been divided into three main parts. The first part deals with some preliminary statistical analysis regarding data screening and data cleaning, descriptive statistics, non-response bias, testing the validity and the reliability of research constructs, and clustering firms into the five stages of the OLC. The second section aims to test the structural models of this study that reflect the relationships between the five OLC stages and six CIO roles without and then with the interaction effect of the organisational information intensity and the organisational strategic IT vision. The results obtained from testing the hypotheses are summarized in the third main section of this chapter.

### 4.2 Preliminary Analysis

Before carrying out any statistical analysis, the data collected should be examined properly (Field 2009). Hence, some preliminary statistical analyses are conducted for three purposes. First, percentages and frequencies were used to calculate the response rate for the survey and to determine and present the profile of survey respondents. Numerical and graphical descriptive tools were then used in order to explore and examine the collected data in terms of missing data, outliers, and distribution. Prior to conducting any main statistical analysis, the validity and the reliability of the research constructs were checked using PLS/SEM. Finally, cluster analysis was performed to cluster respondents' firms into one of the five stages of OLC.

#### 4.2.1 Screen and Clean Data

This step screened and inspected the data file generated from the received questionnaires to identify data entry errors, missing data, outliers, non-normal items, and the independent constructs' multicollinearity. The data is cleaned by correcting

errors, treating missing data, removing outliers and overlapped independent constructs as required prior to conducting the main statistical analysis. The reason for doing this essential step is because the errors, missing data, outliers, and the existence of non-normality and multicollinearity can negatively impact on the statistical analysis and then lead to inaccurate and misleading results. This step is highly recommended by some authoritative data analysis text books by authors such as Hair et al. (2006), Field (2009), Tabachnick and Fidell (2007), and Pallant (2007).

First, the researcher visually checked the entered data twice and corrected the data entry errors detected. Next, frequencies of all research variables were inspected (Pallant 2007) using IBM SPSS 19 in order to ensure that all responses fall within the range of possible values. Some other errors were discovered in this step and corrected. To ensure an error-free data set, the frequencies for all variables were checked again to confirm that input errors had been corrected.

In terms of missing data, data screening indicated the existence of two questionnaires with over 10 per cent of data missing for the key research variables. As a result, a decision was made to eliminate these two responses. Responses with missing data within the acceptable level (under 10%) (Hair et al. 2006) were treated by applying Expectation-Maximization (EM) method (Hair et al. 2006; Tabachnick & Fidell 2007). The expectation maximization algorithm is a natural generalization of maximum likelihood estimation to the incomplete data case. In particular, expectation maximization attempts to find the parameters  $\theta$  that maximize the log probability  $\log P(x; \theta)$  of the observed data (Do & Batzoglou 2008).

As far as the outliers are concerned, this study adopted two recommended methods to detect the existence of any outliers in the data for this study. Outliers refer to ‘cases with values well above or well below the majority of other cases’ (Pallant 2007). Hair et al. (2006) pointed out that outliers can have a marked effect on any type of empirical analysis. The first method used was recommended by Hair et al. (2006) and Tabachnick and Fidell (2007). Data values for all observations were converted to standardized scores (z-scores) and any observations that have z-scores over ( $\pm 3.0$ ) were removed as they are considered outliers. The second method used SPSS to check for the outliers as mentioned by Pallant (2007). The Boxplot for each

observation was checked to identify the outliers that extend more than three box lengths from the edge of the box. These should be removed or replaced. No extreme outliers were found in this study's data set.

With respect to assessing normality, despite PLS/SEM being a distribution free technique (Chin 1998b) it was confirmed in the current study that the PLS/SEM results were markedly improved after treating non-normal items. The non-normal items have been identified first by examining some descriptive statistics of the data such as item skewness, kurtosis, Histogram, Boxplot, Q-Q plot, and P-P plot along with the Kolmogorov-Smirnov test for normality. The graphical and numerical examination of the data leads to some items from the three key continuous research variables (OLC stages, CIO roles, and the information intensity) having  $z$  values of skewness and kurtosis that exceed the most commonly used critical value for  $z$   $\pm$  1.96 (0.05 significance level) (Hair et al. 2006). To normalize the non-normal items identified, different types of transformation were attempted for these items based on the recommendations of Tabachnick and Fidell (2007).

With regard to multicollinearity, the correlation among the independent variables (the five OLC stages) was checked using multiple regression analysis with the collinearity diagnostic option in IBM SPSS 19. Multicollinearity exists when the independent variables are highly correlated ( $r = 0.9$  and above) (Pallant 2007). Hair et al. (2006) argued that the effect of multicollinearity can be categorized in terms of explanation and estimation. The first refers to the difficulties in determining the contribution of each independent variable because the effect of the independent variables are mixed or confounded. In addition, multicollinearity can have a substantial effect on estimation of the regression coefficients and their statistical significance. The results indicate no multicollinearity issue exists for any of the independent variables as the variance inflation factors (VIFs) are all less than two and all tolerance values are all more than 0.5—which easily achieves the acceptable collinearity threshold of 10 for the VIF and 0.1 for tolerance (Hair et al. 2006; Pallant 2007).

## 4.2.2 Descriptive Analysis

### 4.2.2.1 Response Rate and Sample Profile

As mentioned in the previous chapter, data for this study were collected through two postal mail outs followed by an online mail out. Table 4.1 presents some statistics regarding the survey administration that provide the basis to calculate the overall response rate for this study.

**Table 4.1 Survey Responses for 3 Phases of Data Collection**

Round	Survey Type	# Sent	Date Sent	Received	Complete and usable	Incomplete	R.T.S	Not willing to participate
First	Postal Mail	954	28/2/2012	98	96	2	105	4
Second	Postal Mail	950	19/3/2012	65	65	-	-	1
Third	e-mail survey	77	4/07/2012	13	13	-	8	14
<b>Total</b>		<b>1985</b>		<b>176</b>	<b>174</b>	<b>2</b>	<b>113</b>	<b>19</b>

A total of 113 questionnaires were returned to sender (RTS) as undeliverable due to invalid addresses, and emails were received from 19 firms who indicated that they were not willing to participate in this survey for different reasons. With 174 complete and usable responses the response rate of this study was calculated at 20.68 per cent (174/ (954-113)) which is considered to be a reasonable response rate for survey research compared to similar studies involving CIOs reported by Preston et al. (2006) where response rates have ranged from 7 to 20 per cent. It is recognised that the targeted respondents were senior IT executives who are busy people and tend to be over-surveyed. The following section presents the profile of respondents and their firms.

Demographic data regarding respondents' age, gender and education level is presented in Table 4.2. As can be seen from the data presented in Table 4.2, the majority of respondents are male, middle aged, and have a higher degree qualification.



**Table 4.2 CIO Demographics**

<b>Variable</b>	<b>Item</b>	<b>Frequency</b>	<b>Percentage</b>
CIO's Gender	Female	14	8.0 %
	Male	160	92.0 %
	Total	174	100.0 %
CIO's Age	Less than 30 years	6	3.4 %
	31-40 years	32	18.4 %
	41-50 years	62	35.6 %
	51-60 years	69	39.7 %
	Over 60 years	5	2.9 %
	Total	174	100.0 %
CIO's Education Level	PhD/Doctorate	4	2.3 %
	Master Degree	45	25.9 %
	Undergraduate Degree	91	52.3 %
	Secondary School	34	19.5 %
	Total	174	100.0 %

In respect to the CIOs' experience in their currently held position and in IT provision, Table 4.3 provides evidence that the majority of respondents are highly experienced in IT provision and in their current position. Forty-two per cent of the CIOs surveyed have over 6 years in their current position. Also, 68.4 per cent have more than 15 years in IT provision.

**Table 4.3 CIOs' Experience in Current Position and IT Provision**

<b>Variable</b>	<b>Item</b>	<b>Frequency</b>	<b>Percentage</b>
CIO Years in Position	Less than 1 year	20	11.5 %
	1-5 years	80	46.0 %
	6-10 years	46	26.4 %
	Over 10 years	28	16.1 %
	Total	174	100.0 %
CIO Years in IT Provision	Less than 5 years	8	4.6 %
	6-10 years	9	5.2 %
	11-15 years	38	21.8 %
	16-20 years	31	17.8 %
	Over 20 years	88	50.6 %
	Total	174	100.0 %

The CIO job title and their reporting structure are two indicators of the CIOs' power in Australian organisations.

Table 4.4 highlights the profile of the power of respondents. Data presented in

Table 4.4 suggests that nearly half of respondents are empowered IT leaders as they hold the CIO title and they report to the CEO.

**Table 4.4 CIOs' Structural Power in Australian Organisations**

<b>Variable</b>	<b>Item</b>	<b>Frequency</b>	<b>Percentage</b>
CIO Job Title	CIO	77	44.3 %
	CTO	7	4.0 %
	Vice President IT	2	1.1 %
	IT/IS Manager	58	33.3 %
	IT/IS Director	17	9.8 %
	MIS Manager	1	0.6 %
	EDP Manager	1	0.6 %
	Other	11	6.3 %
	Total	174	100.0 %
CIO Reporting Structure	To CEO	74	42.5 %
	To CFO	62	35.6 %
	To COO	16	9.2 %
	To Other	22	12.6 %
	Total	174	100.0 %

The profiles of the CIOs' organisations surveyed in this study are presented in Table 4.5. As can be seen from Table 4.5 the current study includes CIOs from different industries, different size firms, and Australia wide.

**Table 4.5 Profile of Firms Surveyed in this Study**

Variable	Item	Frequency	Percentage
CIOs' Firm Industry	Accommodation, Cafes & Restaurants	3	1.74%
	Communication Services	11	6.34%
	Construction	8	4.60%
	Cultural & Recreational Services	5	2.90%
	Education	4	2.29%
	Electricity, Gas and Water Supply	10	5.74%
	Finance & Insurance	27	15.51%
	Health & Community Services	21	12.06%
	Manufacturing	24	13.79%
	Mining	8	4.60%
	Personal and Other Services	2	1.14%
	Property and Business Services	13	7.47%
	Retail trade	14	8.04%
	Transport & Storage	11	6.32%
	Wholesale Trade	11	6.32%
	Other	2	1.14%
Total	174	100.0%	
CIOs' Firm Size	Less than 50 Employees	13	7.5%
	50-250 Employees	36	20.7%
	Over 250 Employees	125	71.8%
	Total	174	100.0%
CIOs' Firm Location	New South Wales (NSW)	75	43.1%
	Victoria (VIC)	49	28.2%
	Queensland (QLD)	28	16.1%
	Western Australia (WA)	17	9.8%
	South Australia (SA)	4	2.3%
	Australian Capital Territory (ACT)	1	0.6%
	Tasmania (TAS)	0	0.0%
	Northern Territory (NT)	0	0.0%
	Total	174	100.0%

#### 4.2.2.2 Summary Statistics of Key Research Variables

This section presents the descriptive statistics associated with the key continuous and categorical variables used in the research model developed in chapter 2. Table 4.6 depicts the number of items, the mean, and standard deviation for 11 continuous variables.

**Table 4.6 Descriptive Statistics of Key Continuous Research Variables**

Construct(s)		Number of Items	Mean	Standard Deviation
CIO Role*	Information Steward Role	4	5.96	0.70
	Utility Provider Role	4	5.56	0.91
	Educator Role	3	4.84	1.18
	Integrator Role	4	5.00	1.00
	Relationship Architect Role	4	5.62	0.80
	Strategist Role	6	5.38	0.98
The Organisational Life Cycle (OLC)**	Existence Stage	4	3.22	1.27
	Survival Stage	4	3.70	1.01
	Success Stage	4	4.27	0.96
	Renewal Stage	4	4.56	1.09
	Decline Stage	4	3.40	1.13
Information Intensity**		4	5.70	0.10

\*7 point Likert scale from *not important at all* to *critically important*

\*\*7 point Likert scale from “strongly disagree” to “strongly agree”

The frequencies regarding the four categories of the strategic IT vision are presented in Table 4.7.

**Table 4.7 Frequencies for Categorical Research Variables**

Construct		Frequency	Percentage
Strategic IT Vision	To Automate	32	18.39%
	To Informate-up	31	17.82%
	To Informate-down	32	18.39%
	To Transform	79	45.40%
	Total	174	100.0%

### 4.2.3 Non-response Bias and Sample Representativeness

In order to assess non-response bias and following the guidelines presented by Armstrong and Overton (1977) and Sivo et al. (2006) a comparison was conducted between the early respondents (N=21) and late respondents (N=13) in terms of the key research variables listed previously in Table 4.6 and Table 4.7. It is assumed that late responders share similarities with non-responders and, if no significant differences are found between early and late responses, the likelihood is strong that

non-response bias did not occur (Armstrong & Overton 1977). A Mann-Whitney U test was used for this purpose since the data comprised some categorical variables. The Mann-Whitney U test was conducted on the 50 items measuring key variables in this study (presented in Appendix C). Statistically significant differences were found in only two items, which indicates that there are no major differences between early and late respondent CIOs. These results confirmed two important things regarding the data: the absence of non-response bias in the data; and the CIOs' perceptions regarding the research variables were not influenced over the time that the data collection was conducted (Kearns & Lederer 2004).

To check for sample representativeness, a comparison was conducted between the descriptive statistics of two categorical variables (the CIO's firm location and firm industry). A Z-test was conducted to check the significance of the differences between the sample of this study (N= 174) and the working population used in this study as represented by the Dun & Bradstreet (2011) list (N= 954). Table 4.8 and Table 4.9 provide the results of the assessment of the sample representativeness. As can be seen from these two tables, no significant differences were found between the study sample and the study population from which it was obtained except for three items. The results statistically confirmed the representativeness of the sample of this study.

**Table 4.8 Sample vs. Population CIOs' Firms Location Comparison**

CIO's Firm Location	Post Code	Population		Sample		P Value
		Freq.	%	Freq.	%	
NSW	2###	434	45.0 %	75	43.2 %	0.29 ns
VIC	3###	271	28.0 %	49	28.2 %	0.48 ns
QLD	4###	118	12.0 %	28	16.2 %	0.94 ns
WA	6###	77	08.0 %	17	10.0 %	0.83 ns
SA	5###	30	03.0 %	4	2.30 %	0.33 ns
ACT	2600 to 2618 and 29##	9	00.9 %	1	0.06 %	0.36 ns
TAS	7###	12	01.0 %	0	0.00%	0.11 ns
NT	08## and 09##	3	00.3 %	0	0.00%	0.23 ns
<b>Total</b>		<b>954</b>	<b>100.00%</b>	<b>174</b>	<b>100.00%</b>	

ns = Not Significant at  $P < 0.05$

**Table 4.9 Sample vs. Population CIO's Firms Industry Comparison**

Industry	SIC	Population		Sample		P Value
		Freq.	%	Freq.	%	
Agriculture, Forestry, and Fishing	01-09	9	0.9%	0	0.0%	0.000 *
Mining	10-14	34	3.6%	8	4.6%	0.742 ns
Constructions	15-17	29	3.0%	8	4.6%	0.926 ns
Manufacturing	20-39	160	16.8%	24	13.8%	0.147 ns
Transport, Communications, Electricity, Gas, and Sanitary services	40-49	94	9.9%	32	18.4%	0.000 *
Wholesale Trade	50-51	88	9.2%	11	6.3%	0.106 ns
Retail Trade	52-59	48	5.0%	14	8.0%	0.049 ns
Finance, insurance, and real estate	60-67	151	15.8%	40	23.0%	0.990 ns
Services (Accommodation, Cafes & Restaurants, Education, Health & Community Services, Personal and Other Services)	70-89	339	35.5%	35	20.0%	0.000 *
Non-classified	99	2	0.2%	2	1.14%	0.974 ns
<b>Total</b>	---	<b>954</b>	<b>100.0%</b>	<b>174</b>	<b>100.0%</b>	

\*Significant at  $p < 0.05$ ; ns = Not Significant at  $P < 0.05$

#### 4.2.4 Evaluation of Measurement Model

The validity and reliability of the instruments used in this study were checked prior to any further inferential analyses. This step is applicable for the continuous constructs, but not for the categorical ones. The collected data were analysed using the component based (also known as partial least squares) structural equation modelling method (PLS/SEM). The CIO roles, OLC stages, and information intensity constructs were modelled as reflective (or mode A) constructs. Hence, five major areas should be tested to ensure measurement validity (Henseler et al. 2009): (1) reliability at the construct level; (2) reliability at the indicators level; (3) convergent validity; (4) discriminant validity at the construct level; and (5) discriminant validity at the indicators level. PLS Graph-alpha Version 03.12 Build 01 software (courtesy Dr. Wynne W. Chin-University of Houston-USA) was used to test the measurement (outer) model.

Following common criteria suggested by Chin (1998a, 1998b, 2010); Hulland (1999); Gefen and Straub (2005); Hair et al. (2006); and Henseler et al. (2009) the researcher examined the inter-construct correlations, composite reliabilities, average variance extracted for each construct, item loadings on their constructs and item cross loadings on other constructs. These statistics are presented in Table 4.10 and Table 4.11.

Table 4.10 Inter-construct Correlations and Reliability Measures

Construct *	CR	AVE	Existence	Survival	Success	Renewal	Decline	Strategist	Relationship Architect	Integrator	Educator	Utility Provider	Information Steward	Information Intensity
<b>Existence</b>	0.79	0.56	<b>0.75**</b>											
<b>Survival</b>	0.71	0.45	0.32	<b>0.67</b>										
<b>Success</b>	0.74	0.58	0.57	0.21	<b>0.76</b>									
<b>Renewal</b>	0.75	0.51	-0.50	-0.12	-0.49	<b>0.74</b>								
<b>Decline</b>	0.78	0.54	0.49	0.21	0.23	-0.39	<b>0.75</b>							
<b>Strategist</b>	0.88	0.56	0.10	-0.01	0.20	-0.25	0.23	<b>0.85</b>						
<b>Relationship Architect</b>	0.88	0.72	-0.02	-0.00	0.06	0.00	-0.11	0.35	<b>0.85</b>					
<b>Integrator</b>	0.83	0.56	0.01	-0.02	0.13	-0.19	0.11	0.53	0.39	<b>0.75</b>				
<b>Educator</b>	0.90	0.76	0.09	0.11	-0.02	0.20	-0.05	-0.56	-0.26	-0.49	<b>0.87</b>			
<b>Utility Provider</b>	0.84	0.58	-0.05	0.07	-0.01	-0.15	0.07	0.23	0.32	0.45	-0.22	<b>0.76</b>		
<b>Information Steward</b>	0.81	0.59	0.10	0.09	0.02	0.10	-0.00	-0.46	-0.44	-0.40	0.44	-0.44	<b>0.77</b>	
<b>Information Intensity</b>	0.89	0.68	0.01	0.19	0.30	0.30	0.15	0.16	0.02	0.21	0.09	0.24	-0.21	<b>0.82</b>
*all items measured using seven point Likert scale ** Square root of AVE on diagonal CR = Composite Reliability AVE = Average Variance Extracted														

**Table 4.11 Outer Model Loadings and Cross Loadings**

Construct Item	Existence	Survival	Success	Renewal	Decline	Strategist	Integrator	Relationship Architect	Educator	Utility Provider	Information Steward	Information Intensity
Exis1	<b>0.79*</b>	0.35	0.60	0.46	0.40	0.15	0.06	-0.02	0.02	0.01	-0.01	0.27
Exis3	<b>0.79</b>	0.19	0.26	0.42	0.34	0.02	-0.04	-0.04	0.12	-0.12	0.11	-0.01
Exis4	<b>0.69</b>	0.35	0.60	0.46	0.40	0.15	0.06	-0.02	0.02	0.01	-0.01	0.27
Surv2	0.17	<b>0.69</b>	0.09	0.03	0.15	-0.01	-0.07	-0.03	-0.01	-0.06	0.01	-0.08
Surv3	0.26	<b>0.68</b>	0.18	0.23	0.21	-0.00	0.00	0.00	0.11	0.11	0.02	0.20
Surv4	0.21	<b>0.64</b>	0.16	0.02	0.06	-0.04	-0.12	-0.04	0.01	-0.03	0.18	0.11
Suc1	0.41	0.02	<b>0.76</b>	0.16	0.11	0.07	0.02	0.06	0.02	-0.07	0.14	0.09
Suc4	0.46	0.31	<b>0.76</b>	0.58	0.24	0.24	0.17	-0.06	-0.06	0.06	0.10	0.36
Ren2	0.51	0.08	0.36	<b>0.79</b>	0.32	-0.19	-0.16	0.02	0.13	-0.11	0.04	-0.16
Ren3	0.44	0.19	0.60	<b>0.75</b>	0.22	-0.24	-0.21	-0.10	0.16	-0.13	0.09	-0.36
Ren4	0.04	0.04	0.02	<b>0.58</b>	0.30	-0.08	0.01	0.12	0.14	-0.07	0.11	-0.11
Dec1	0.45	0.22	0.24	0.27	<b>0.71</b>	0.18	0.10	-0.06	-0.01	0.05	0.04	0.10
Dec3	0.41	0.22	0.16	0.42	<b>0.77</b>	0.19	0.03	-0.09	-0.05	0.07	-0.04	0.12
Dec4	0.21	0.03	0.12	0.17	<b>0.72</b>	0.14	0.12	-0.10	-0.04	0.03	-0.01	0.12
Stra1	-0.15	0.02	-0.10	0.26	-0.28	<b>0.68</b>	0.33	0.27	0.33	0.12	0.36	0.07
Stra2	0.11	-0.04	0.16	-0.29	0.18	<b>0.74</b>	0.54	0.27	0.40	0.25	0.36	0.14
Stra3	0.17	-0.04	0.21	-0.22	0.10	<b>0.75</b>	0.49	0.26	0.39	0.25	0.29	0.05
Stra4	0.03	-0.07	0.16	-0.13	0.10	<b>0.76</b>	0.55	0.36	0.55	0.25	0.41	0.09
Stra5	0.01	0.06	0.17	-0.10	0.20	<b>0.78</b>	0.26	0.2	0.44	0.10	0.35	0.21
Stra6	-0.01	0.05	0.11	-0.12	0.19	<b>0.77</b>	0.20	0.17	0.40	0.06	0.29	0.16
Integ1	0.06	-0.04	0.12	-0.19	0.15	0.45	<b>0.75</b>	0.21	0.25	0.50	0.43	0.27
Integ2	-0.08	-0.06	-0.20	0.21	-0.05	0.37	<b>0.65</b>	0.26	0.46	0.24	0.27	0.15
Integ3	0.13	0.06	0.09	0.07	-0.01	0.28	<b>0.76</b>	0.22	0.33	0.31	0.27	0.06
Integ4	0.04	0.00	0.16	-0.10	0.10	0.47	<b>0.81</b>	0.32	0.43	0.29	0.24	0.14
Re.Arch1	0.02	0.02	0.08	0.04	-0.11	0.26	0.27	<b>0.81</b>	0.14	0.20	0.29	0.04
Re.Arch2	0.09	0.00	0.05	-0.05	-0.08	0.33	0.32	<b>0.90</b>	0.31	0.31	0.37	0.04
Re.Arch3	-0.08	-0.02	0.04	0.03	-0.09	0.29	0.26	<b>0.82</b>	0.22	0.31	0.45	0.05
Edu1	0.06	0.10	-0.06	0.28	-0.07	0.42	0.48	0.22	<b>0.84</b>	0.29	0.43	0.15
Edu2	-0.05	-0.13	-0.03	-0.15	0.03	0.55	0.44	0.24	<b>0.88</b>	0.11	0.36	0.06
Edu3	0.12	0.05	-0.03	0.10	-0.02	0.49	0.36	0.24	<b>0.89</b>	0.19	0.37	0.02
Ut.Prov1	-0.08	-0.07	0.06	0.11	-0.08	0.11	0.23	0.26	0.11	<b>0.68</b>	0.30	0.04
Ut.Prov2	-0.01	0.09	0.00	-0.18	0.09	0.17	0.37	0.21	0.22	<b>0.81</b>	0.33	0.24
Ut.Prov3	-0.07	-0.02	-0.01	-0.02	-0.03	0.09	0.32	0.24	0.16	<b>0.81</b>	0.34	0.18
Ut.Prov4	-0.08	0.08	0.06	-0.15	0.08	0.33	0.45	0.27	0.20	<b>0.73</b>	0.35	0.25
Info.St2	-0.06	-0.03	-0.03	-0.16	0.09	0.36	0.41	0.41	0.31	0.40	<b>0.71</b>	0.16
Info.St3	0.12	0.12	0.03	0.04	0.01	0.44	0.34	0.36	0.44	0.30	<b>0.79</b>	0.20
Info.St4	0.05	0.05	0.00	0.05	0.06	0.26	0.19	0.25	0.29	0.32	<b>0.81</b>	0.13
Info.Intn1	0.15	0.14	0.31	-0.26	0.12	0.13	0.17	0.07	0.04	0.15	0.15	<b>0.88</b>
Info.Intn2	0.13	0.26	0.21	-0.25	0.18	0.08	0.17	0.07	0.04	0.17	0.09	<b>0.88</b>
Info.Intn3	0.01	0.14	0.20	-0.19	0.05	0.13	0.15	0.05	0.07	0.26	0.25	<b>0.76</b>
Info.Intn4	0.17	0.10	0.24	-0.29	0.16	0.20	0.22	0.03	0.23	0.22	0.21	<b>0.78</b>

\*Factor Loadings are shown in boldface

#### 4.2.4.1 Composite Reliability

As can be seen from Table 4.10, the composite reliability (CR) for all constructs exceeds the satisfactory level of 0.7 proposed by Werts, Linn and Jöreskog (1974) thereby supporting internal consistency reliability.



#### **4.2.4.2 Reliability at the Indicators Level**

Reliability at the indicators level can be checked by examining the item loadings on their respective constructs (see Table 4.11). Chin (1998b) and (Henseler et al. 2009) suggested 0.7 as an absolute standardised outer loading to ensure that the indicator has captured at least half of the variance, however, items with 0.5 or 0.6 loadings are still acceptable if additional indicators in the block for comparison basis exist (Chin 1998b, p. 325). The factor loadings of 49 items exceed the standardized cut off of 0.7 except for sixteen items of which seven are over 0.6, one over 0.5, and eight are below 0.5. A decision was made to keep the first eight items (over 0.5) as long as the composite reliability for their respective constructs is still over the satisfactory level of 0.7 (Henseler et al. 2009) and to remove the eight items with factor loadings less than 0.5.

#### **4.2.4.3 Convergent Validity**

The average variances extracted (AVEs) proposed by Fornell and Larcker (1981) for all research constructs as shown in Table 4.10 exceed the acceptable cut off of 0.5 (except for survival stage construct 0.44) which indicates sufficient convergent validity.

#### **4.2.4.4 Discriminant Validity at the Indicators Level**

Data presented in Table 4.11 show that all remaining items are strongly related (load) on the constructs they were intended to measure and they do not have a stronger connection with another construct (cross load).

#### **4.2.4.5 Discriminant Validity at the Construct Level**

The square root of the AVE values of all constructs presented in the diagonal of Table 4.10 are larger than the inter-correlation of the constructs in the model (Gefen & Straub 2005). This means that all constructs shared more variance with their own measures than with others. This provides evidence that constructs in this study had adequate discriminant validity.

Having prepared the data for analysis, established the absence of non-response bias, and confirmed the reliability and validity of the research constructs, the next stage of

the data analysis is clustering firms into the five OLC stages in order to treat each cluster separately in the next stage of the statistical analysis.

#### **4.2.5 Cluster Firms into the OLC Stages**

This study applied a combination approach (two-step) to cluster using a hierarchical approach followed by a non-hierarchical approach. Using IBM SPSS version 19 for Windows, a hierarchical clustering using Ward's linkage method and ANOVA comparing with a square Euclidean distance method to measure the similarity was performed in order to identify the optimal number of clusters. Hair et al. (2006) suggest that the optimal number of clusters can be identified when the coefficient in the agglomeration schedule markedly increases. Based upon the study data, the coefficient starts increasing more noticeably after six clusters (4.7%), five clusters (5.7%), four clusters (10.9%), three clusters (6.9%), and two clusters (18.2%). These figures indicate that three, four or five clusters are appropriate solutions. The decision was made to adopt a five cluster solution as it is consistent with OLC theory and the well-established five stages OLC models (e.g., Churchill & Lewis 1983; Greiner 1972; Lester et al. 2003; Miller & Friesen 1984). Table 4.12 shows the agglomeration schedule for the OLC cluster sample.

**Table 4.12 Agglomeration Schedule for the OLC Cluster Sample**

Number of Clusters after Combining	Stage	Agglomeration last Step	Coefficients this Step	Differences	Proportionate Increase in Heterogeneity to Next Stage	Stopping Rule
8	167	3442.738	3295.330	147.408	4.4	
7	168	3601.286	3442.738	158.548	4.6	
6	169	3770.539	3601.286	169.253	4.7	
5	170	3988.144	3770.539	217.605	5.7	Increase is relatively larger the previous stage favouring five to four clusters
4	171	4205.793	3988.144	435.649	10.9	Increase is larger the previous stage favouring four to three clusters
3	172	4495.735	4205.793	289.942	6.9	
2	173	5315.445	4495.735	819.710	18.2	

Developed for this study based on the recommendation of Hair et al. (2006)

Next, a non-hierarchical clustering approach using the K-means method was applied to identify the cases' membership. The results revealed that 44 firms were categorized in cluster 1; another 44 firms in cluster 2; 29 firms in cluster 3; 35 in cluster 4; and 21 in cluster 5. The ANOVA significant statistics suggest that all clustering variables do differ between the five clusters. The predictive accuracy of the five cluster solution measured by applying multiple discriminant analysis is found to be 94.3 per cent—which indicates satisfactory clustering validity. To check the clustering reliability, the data was split randomly into halves and a clustering was performed for the cases in each half. After that a comparison among the cluster centres (means) for the two subsamples was conducted using one way ANOVA. No significant differences have been found among the means of the two halves which assured clustering reliability (Malhorta et al. 2002).

Two types of statistics have been examined rationally across the generated clusters in order to profile and label them precisely in light of the recommendation of Hair et al. (2006) and Malhorta et al. (2002). The first was the final cluster centres values (centroids) of the variables already considered in clustering. The second type were

descriptive statistics of another two demographic variables related to the respondent's firm (organisation size and organisation age) that were not used for clustering (silent variables).

The comparison resulted in labelling the 44 firms in cluster 1 Renewal stage; 44 firms in cluster 2 Success stage, 29 firms in cluster 3 Survival stage, 35 firms in cluster 4 Existence stage, and 21 firms in cluster 5 Decline stage. Table 4.13 exhibits a comparison of these five clusters in terms of their cluster centres values alongside the ANOVA significant statistics (panel A), the mean and the median of the two demographics salient variables (panel B) with clustering validity indicators including clustering predictive accuracy obtained from the discriminant analysis (panel C).

Table 4.13 Comparison of Clusters and Clustering Validation Results

Panels	OLC Stage	Total N= 174	Cluster 1 N= 44	Cluster 2 N=44	Cluster 3 N= 29	Cluster 4 N=35	Cluster 5 N= 21	ANOVA	
								F. Statistic	Sign.
<i>Panel A</i> Cluster Means	Existence	3.22	1.90	3.11	4.31	<b>4.23</b>	4.03	16.42	.000
	Survival	3.70	2.89	4.40	<b>4.54</b>	3.18	3.95	18.67	.000
	Success	4.27	4.77	<b>4.82</b>	3.78	4.16	3.71	8.67	.000
	Renewal	4.46	<b>5.32</b>	4.40	3.96	3.45	2.97	15.95	.000
	Decline	3.40	2.39	2.94	4.28	3.76	<b>4.51</b>	20.06	.000
<i>Panel B</i> Descriptive statistics of another two silent variables	Organisation Age (Years since foundation)							27.16	.000
	Mean	44.66	65.6	56.78	38.81	34.85	43.42		
	Median	29	59	32	29	25	32		
	Organisation Size								
	1= Less than 50 employees	15	-	2	5	6	2		
2= 50-250 employees	36	2	7	7	11	9			
3= over 250 employees	123	42	35	17	19	10		N/A	
<i>Panel C</i> Clustering Validation	Number of firms correctly classified	164	39	42	28	34	21		N/A
	Predictive Accuracy (Hit Ratio)*	164/174 = 94.3 %	39/44= 88.6%	42/44= 95.5 %	28/29= 96.6 %	34/36= 94.4%	21/21= 100%		N/A
<i>Panel D</i> Clusters Label		N/A	Renewal	Success	Survival	Existence	Decline		-

\*Predictive Accuracy = Number of firms correctly classified by clustering / total number of firms

## 4.3 Structural Model Evaluation and Hypotheses Tests

After checking the appropriateness of the psychometric properties of the research measures and clustering respondent firms into five OLC stages, the next step is to provide evidence supporting the hypothesized relationships between the exogenous (independent) and endogenous (dependent) latent variables (LVs) in the proposed research model (see Figure 2.4). The next section presents the results obtained from assessing the structural model for each OLC stage, along with the assessment of the moderating effect of organisational information intensity and organisational strategic IT vision. It is worth mentioning that testing hypothesis H<sub>1</sub> was postponed until H<sub>2</sub>, H<sub>3</sub>, and H<sub>4</sub> were tested because it depends on the results of these hypotheses.

### 4.3.1 CIO Roles in Early Stages of the OLC

This section aims to address hypothesis H<sub>2</sub> ‘*The characteristics of early stages of the OLC (Existence and Survival), would predominate operational/supply side roles of the CIO (Utility Provider, Information Steward, and Educator)*’. In order to test this hypothesis the structural model (the inner model) for each of the two early stages of the OLC model (Existence and Survival) was tested individually using PLS/SEM. This allowed the researcher to:

- ❖ estimate the path coefficients (also referred to as standardized beta coefficient  $\beta$  of ordinary least square regression) which indicate the strength of the relationship between the independent and dependent variables;
- ❖ assess its significance (T-test based bootstrapping approach);
- ❖ check the predictive power ( $R^2$ ) for the independent variables; and
- ❖ estimate the goodness of fit (GoF) of the structural model for each stage.

#### 4.3.1.1 CIO Roles in Existence Stage

Based on the data of 36 firms identified in the Existence stage, path estimation was performed between the existence stage construct as an independent variable and six CIO roles as dependent variables. Then, a bootstrapping approach was used as a nonparametric approach to estimate the precision of the PLS estimates (Chin 1998b).

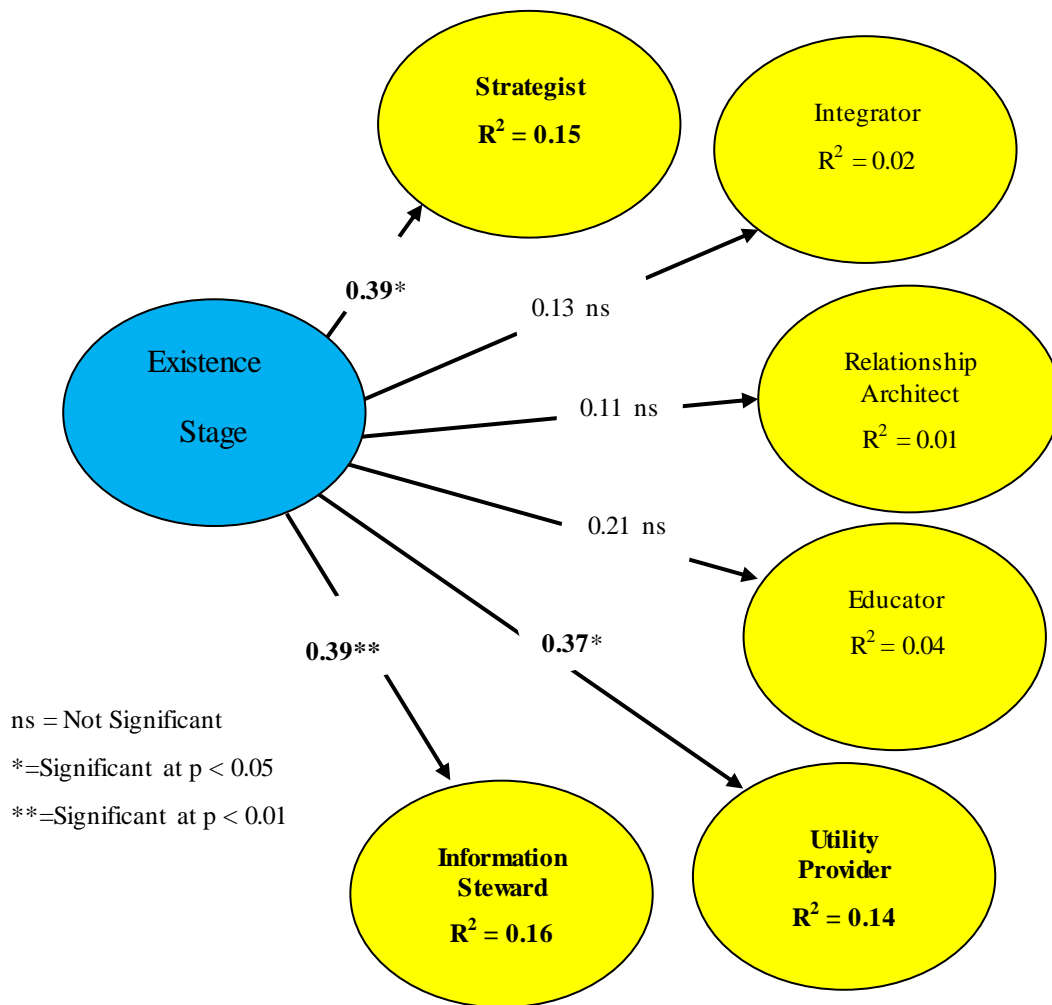
In order to test the significance of path estimates, 200 random samples from the original sample were generated. Path estimation-based PLS provides information regarding the predictive power (variance explained in dependent variables or  $R^2$ ) of each path. To estimate the structural model goodness of fit, this research used the global criterion of goodness of fit (GoF) proposed by Tenenhaus, Vinzi, Chatelin and Lauro (2005). Global goodness of fit represents a geometric mean of the average communality which can be calculated based on the measurement model results and the average of  $R^2$  for the dependent variables. Table 4.15 presents PLS analysis results numerically, while Figure 4.1 illustrates the PLS analysis results graphically.

**Table 4.14 PLS Analysis Results for CIO Roles in Existence Stage (N=36)**

Path	Path Coefficient ( $\beta$ )	T-test	Sig.	P	$R^2$	Model GoF
Existence Stage $\rightarrow$ Strategist Role	<b>0.39</b>	<b>1.71*</b>	*	0.05	0.15	0.23
Existence Stage $\rightarrow$ Relationship Architect Role	0.11	0.43	ns	-	0.01	
Existence Stage $\rightarrow$ Integrator Role	0.13	0.47	ns	-	0.02	
Existence Stage $\rightarrow$ Educator Role	0.21	0.75	ns	-	0.04	
Existence Stage $\rightarrow$ Information Steward Role	<b>0.39</b>	<b>2.30**</b>	**	0.01	0.16	
Existence Stage $\rightarrow$ Utility Provider Role	<b>0.37</b>	<b>1.80*</b>	*	0.05	0.14	

*ns = Not Significant, \*  $p < 0.05$ , \*\*  $p < 0.01$*

**Figure 4.1 The Relationship between Existence Stage and CIO Roles**



It can be seen from Table 4.14 and Figure 4.1 that there are significant relationships between the Existence stage of the OLC model and three of the six CIO roles, specifically information steward, strategist, and utility provider. An evaluation of the productiveness power of the Existence stage-CIO roles structural model in terms of the  $R^2$  of the independent variables shows that the  $R^2$  of the three CIO roles exceeds the minimum 10 per cent criterion suggested by Falk and Miller (1992) which represents a reasonable amount of variance explained in CIO roles. The theoretical model for this study examines the relationship between one independent variable (each of the five OLC stages) and six dependent variables (the CIO six roles) one at a time. In other words, the  $R^2$  values obtained here reflect the contribution of only one independent variable (one OLC stage). Considering the exploratory nature of this study and the complexity of the structural model, the  $R^2$  values obtained here can be considered reasonable as they exceed the minimum 10 per cent criterion suggested by



Falk and Miller (1992). The model goodness of fit (GoF) for the Existence stage of the OLC -CIO roles model is 0.23, which is considered to be moderate explanatory power in comparison with baseline values ( $GoF_{small} = 0.1$ ,  $GoF_{medium} = 0.25$ ,  $GoF_{large} = 0.36$ ) (Akter, D'Ambra & Ray 2011).

#### 4.3.1.2 CIO Roles in Survival Stage

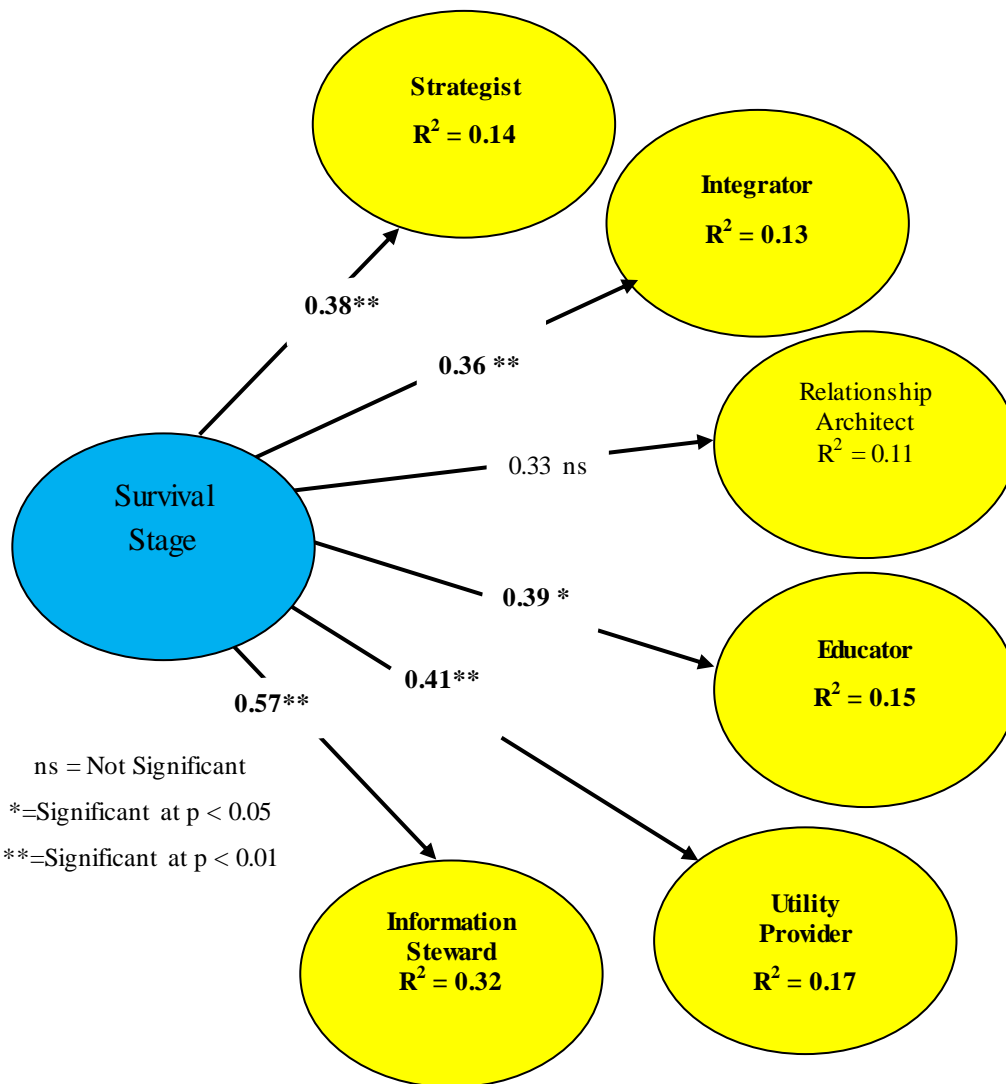
Data obtained from senior IT leaders identified 29 firms in the survival stage of the OLC model. Table 4.15 reports PLS results that explain the relationship between the survival stage and six CIO roles. Figure 4.2 shows the structural model results.

**Table 4.15 PLS Analysis Results for CIO Roles in Survival Stage (N=29)**

Path	Path Coefficient ( $\beta$ )	T-test	Sig.	P	R <sup>2</sup>	Model GoF
Survival Stage → Strategist Role	<b>0.38</b>	<b>2.58</b>	**	0.01	0.14	0.32
Survival Stage → Relationship Architect Role	0.33	1.44	ns	-	0.11	
Survival Stage → Integrator Role	<b>0.36</b>	<b>2.22</b>	**	0.01	0.13	
Survival Stage → Educator Role	<b>0.39</b>	<b>1.85</b>	*	0.05	0.15	
Survival Stage → Information Steward Role	<b>0.57</b>	<b>3.28</b>	**	0.01	0.32	
Survival Stage → Utility Provider Role	<b>0.41</b>	<b>2.48</b>	**	0.01	0.17	

*ns = Not Significant, \*  $p < 0.05$ , \*\*  $p < 0.01$*

**Figure 4.2 The Relationship between Survival Stage and CIO Roles**



As shown in Table 4.15 and Figure 4.2, the Survival stage of OLC model presents five significant relationships out of six between the Survival stage of the OLC model and the CIO roles of information steward, utility provider, educator, strategist, and integrator respectively. In comparison with the Existence stage, the relationships between the survival stage and the CIO roles represented by the path coefficients ( $\beta$ ) show an improvement in the CIO roles as the firm moves from one stage of its life cycle to the next one. The predictive power ( $R^2$ ) of the independent variables (CIO roles) indicates satisfactory values as all were over the minimum criterion of  $R^2$  of 0.10 as recommended by Falk and Miller (1992). In addition, the goodness of fit (GoF) for the Survival stage model was 0.36, which is higher than the GoF of the Existence stage model (0.23) and indicates a substantial amount of fit.

The results obtained from the assessment of the structural model for the two early stages of the OLC model (Existence and Survival) provide support for research hypothesis two ( $H_2$ ) where the IT leaders at these two stages ranked the supply side roles (in terms of the values and significance of the path coefficients  $\beta$ ) as more important than demand side roles. Table 4.16 provides CIO roles rankings for supply side and demand side across the two early stages of the OLC model.

**Table 4.16 CIO Roles across Early Stages of OLC**

CIO Roles		Early Stages of the OLC			
		Existence Stage N=36		Survival Stage N=29	
		$\beta$	Rank	$\beta$	Rank
Supply Side Roles	Information Steward	0.39**	1	0.57**	1
	Utility Provider	0.37*	3	0.41**	2
	Educator	0.21 ns	-	0.39*	3
Demand Side Roles	Strategist	0.39*	2	0.38**	4
	Relationship Architect	0.11 ns	-	0.33 ns	-
	Integrator	0.13 ns	-	0.36**	5

ns = Not Significant, \*  $p < 0.05$ , \*\*  $p < 0.01$

### 4.3.2 CIO Roles in Late Stages of OLC

This section focuses on hypothesis three ( $H_3$ ), stated as ‘*The characteristics of late stages of the OLC (Success and Renewal), would predominate strategic/demand side roles of the CIO (Integrator, Relationship Architect, and Strategist)*’. In order to test this hypothesis the structural model (the inner model) for each of the two late stages (Success and Renewal) will be tested separately using PLS/SEM. This allowed the researcher to:

- ❖ estimate the path coefficients (also referred to as standardized beta coefficient  $\beta$  of ordinary least square regression) which indicate the strength of the relationship between the independent and dependent variables;
- ❖ assess its significance (T-test based bootstrapping approach);
- ❖ check the predictive power ( $R^2$ ) for the independent variables; and
- ❖ estimate the goodness of fit (GoF) of the structural model for each stage.

### 4.3.2.1 CIO Roles in Success Stage

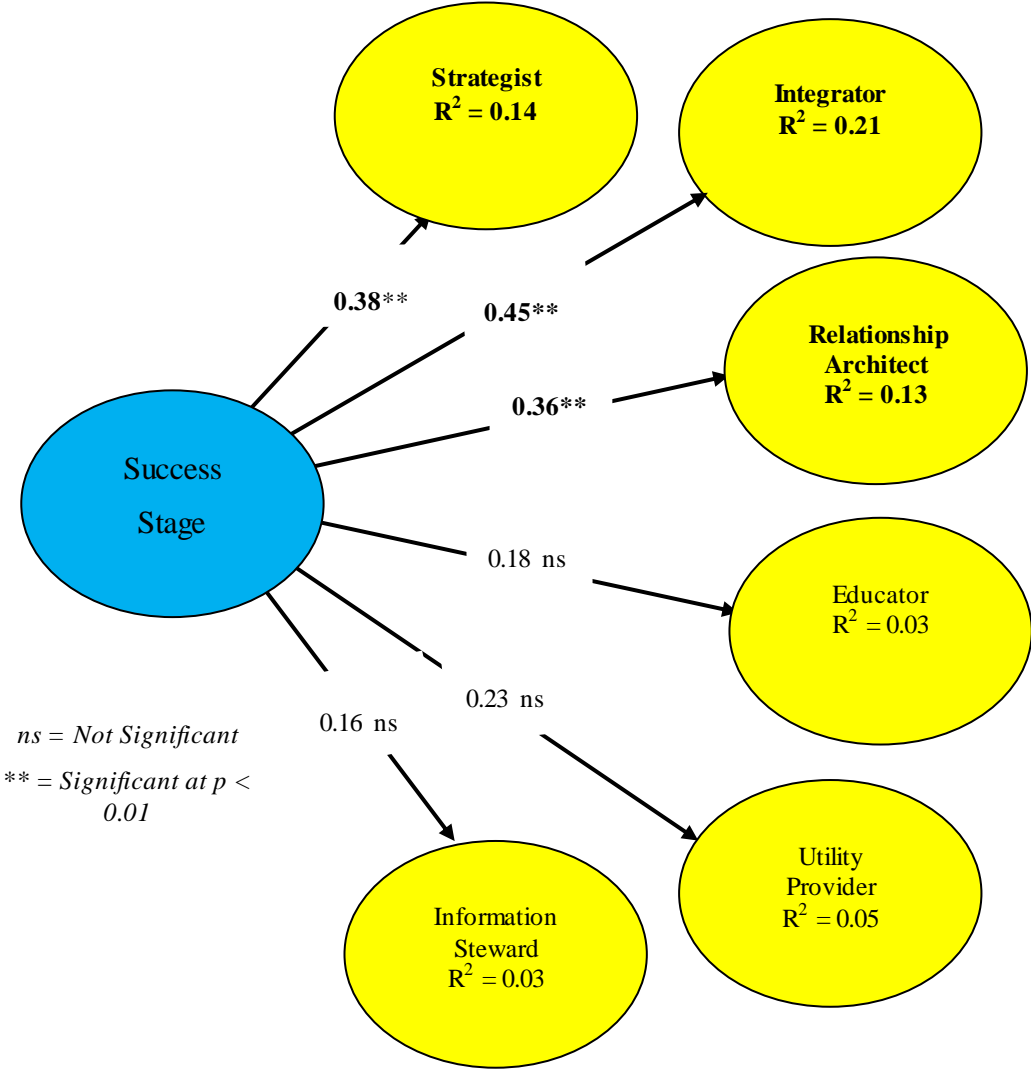
The responses of 44 CIOs working at firms identified as being in the success stage of OLC were used to identify the configuration of their roles at this specific stage. Accordingly, path estimation was performed between the success stage construct as an independent variable and six CIO roles as dependent variables. Table 4.17 and Figure 4.3 show PLS results regarding the CIO role configuration in the Success stage of the OLC.

**Table 4.17 PLS Analysis Results for CIO Roles in Success Stage (N=44)**

Path	Path Coefficient ( $\beta$ )	T-test	Sig.	P	R <sup>2</sup>	Model GoF
Success Stage → Strategist Role	<b>0.38</b>	<b>2.00</b>	**	0.01	0.14	0.25
Success Stage → Relationship Architect Role	<b>0.36</b>	<b>2.14</b>	**	0.01	0.13	
Success Stage → Integrator Role	<b>0.45</b>	<b>2.37</b>	**	0.01	0.21	
Success Stage → Educator Role	0.18	0.84	ns	-	0.03	
Success Stage → Information Steward Role	0.16	0.70	ns	-	0.03	
Success Stage → Utility Provider Role	0.23	0.92	ns	-	0.05	

*ns = Not Significant, \*\*  $p < 0.01$*

Figure 4.3 The Relationship between Success Stage and CIO Role



It can be seen from Table 4.17 and Figure 4.3 that there are significant relationships between the Success stage and three out of six CIO roles: the integrator, strategist, and relationship architect CIO roles respectively. An evaluation of the predictive power of the Success stage as a dependent variable in terms of the  $R^2$  of the independent variables shows that the  $R^2$  of the three out of six CIO roles exceeds the minimum 10 per cent criterion suggested by Falk and Miller (1992), which represents the reasonable amount of variance explained in CIO roles. The GoF for the Success stage-CIO roles model is found to be 0.25 which considered to be moderate explanatory power in comparison with baseline values (  $GoF_{small} = 0.1$ ,  $GoF_{medium} = 0.25$ ,  $GoF_{large} = 0.36$ ) (Akter et al. 2011).

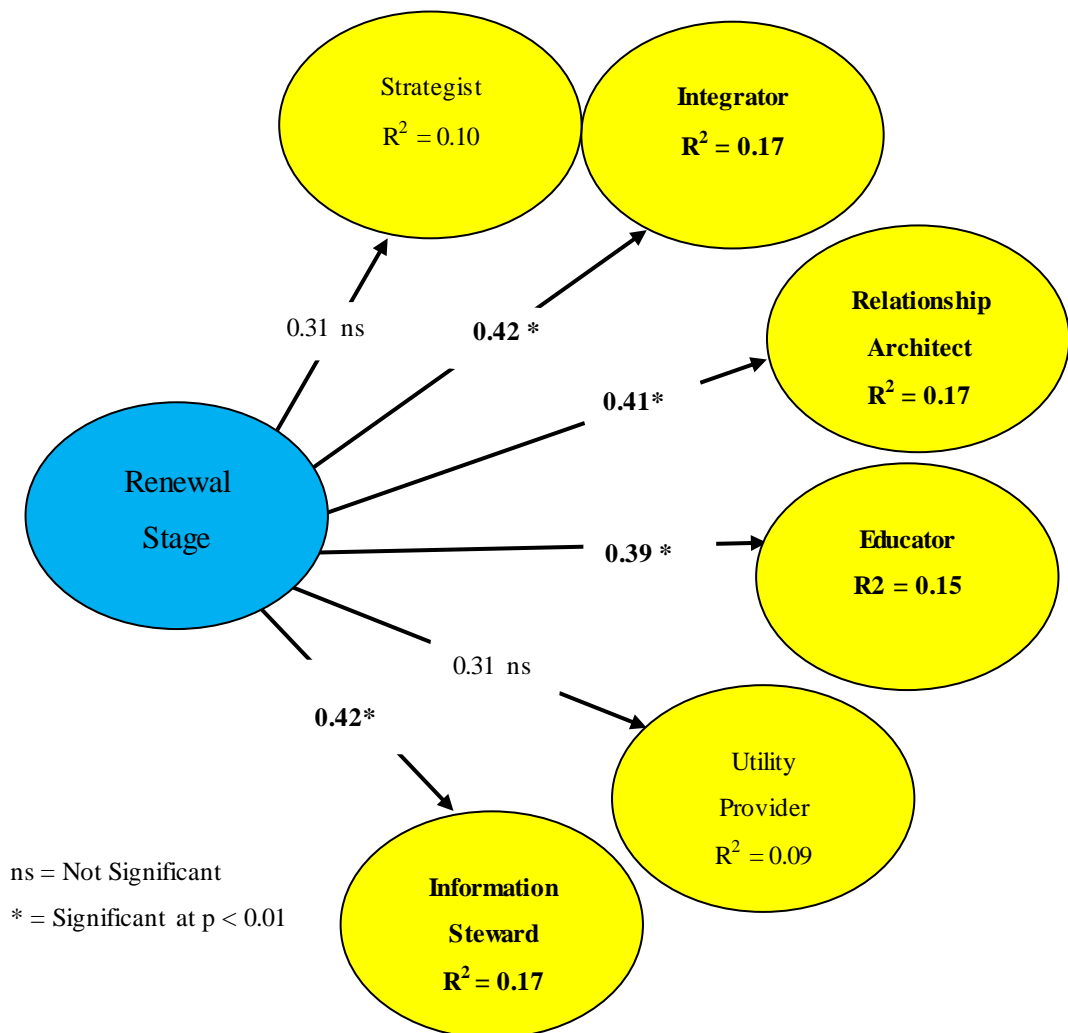
#### 4.3.2.2 CIO Roles in Renewal Stage

With respect to the CIO role in the Renewal stage of the OLC, data acquired from 44 senior IT leaders of firms identified as in Renewal stage was used to evaluate the parameters provided by the PLS structural model. Table 4.18 and Figure 4.4 present PLS results regarding the relationship between the Renewal stage and six CIO roles.

**Table 4.18 PLS Analysis Results for CIO Roles in Renewal Stage (N=44)**

Path	Path Coefficient ( $\beta$ )	T-test	Sig.	P	$R^2$	Model GoF
Renewal Stage → Strategist Role	0.31	1.56	ns	-	0.10	0.28
Renewal Stage → Relationship Architect Role	<b>0.41</b>	<b>2.80</b>	*	0.01	0.17	
Renewal Stage → Integrator Role	<b>0.42</b>	<b>2.61</b>	*	0.01	0.17	
Renewal Stage → Educator Role	<b>0.39</b>	<b>3.36</b>	*	0.01	0.15	
Renewal Stage → Information Steward Role	<b>0.42</b>	<b>3.10</b>	*	0.01	0.17	
Renewal Stage → Utility Provider Role	0.31	1.58	ns	-	0.09	

*ns = Not Significant, \*  $p < 0.05$*

**Figure 4.4 The Relationship between Renewal Stage and CIO Roles**

As shown in Table 4.18 and Figure 4.4, the Renewal stage model presents four significant relationships out of six between the Renewal stage and the roles of information steward, integrator, relationship architect, and educator respectively. The predictive power ( $R^2$ ) of the independent variables (CIO roles) indicates satisfactory values as most of them were over the minimum criterion of  $R^2$  (Falk & Miller 1992). In addition, the goodness of fit (0.28) for the Renewal stage model was higher than the GoF of the Success stage as it represents a substantial amount of fit.

The results obtained from the assessment of the structural model of late stages of the OLC (Success and Renewal) provides support for research hypothesis two ( $H_2$ ) where the IT leaders at these two stages ranked the demand side roles (in terms of the

values and significance of the path coefficients  $\beta$ ) as more important than supply side roles. Table 4.19 provides the CIO roles ranking across the late stages of the OLC.

**Table 4.19 CIO Roles Ranked across the Late Stages of the OLC**

CIO Roles		Late Stages of the OLC			
		Success Stage (N=44)		Renewal Stage (N=44)	
		$\beta$	Rank	$\beta$	Rank
Supply Side Roles	Information Steward	0.16 ns	-	0.42**	1
	Utility Provider	0.23 ns	-	0.31 ns	-
	Educator	0.18 ns	-	0.389**	4
Demand Side Roles	Strategist	0.38*	2	0.31 ns	-
	Relationship Architect	0.36*	3	0.41**	2
	Integrator	0.45**	1	0.42**	1

ns = Not Significant, \*  $p < 0.05$ , \*\*  $p < 0.01$

### 4.3.3 CIO Roles in Decline Stage of the OLC

The distinctive characteristic of Decline stage of the OLC that can occur at any stage of the firm life cycle (Lester et al. 2003) imposes treating this stage separately. The aim of this section is to test research hypothesis four (H4) which states ‘*The characteristics of decline stage of the OLC would predominate strategic /demand side roles of the CIO (Integrator, Relationship Architect, and Strategist)*’. Following the same steps to examine the CIO role as in previous OLC stages and based on data obtained from 21 CIOs of firms in the Decline stage, the structural model of the Decline stage was tested using PLS path modelling. Table 4.20 and Figure 4.5 provide the results acquired from PLS analysis.

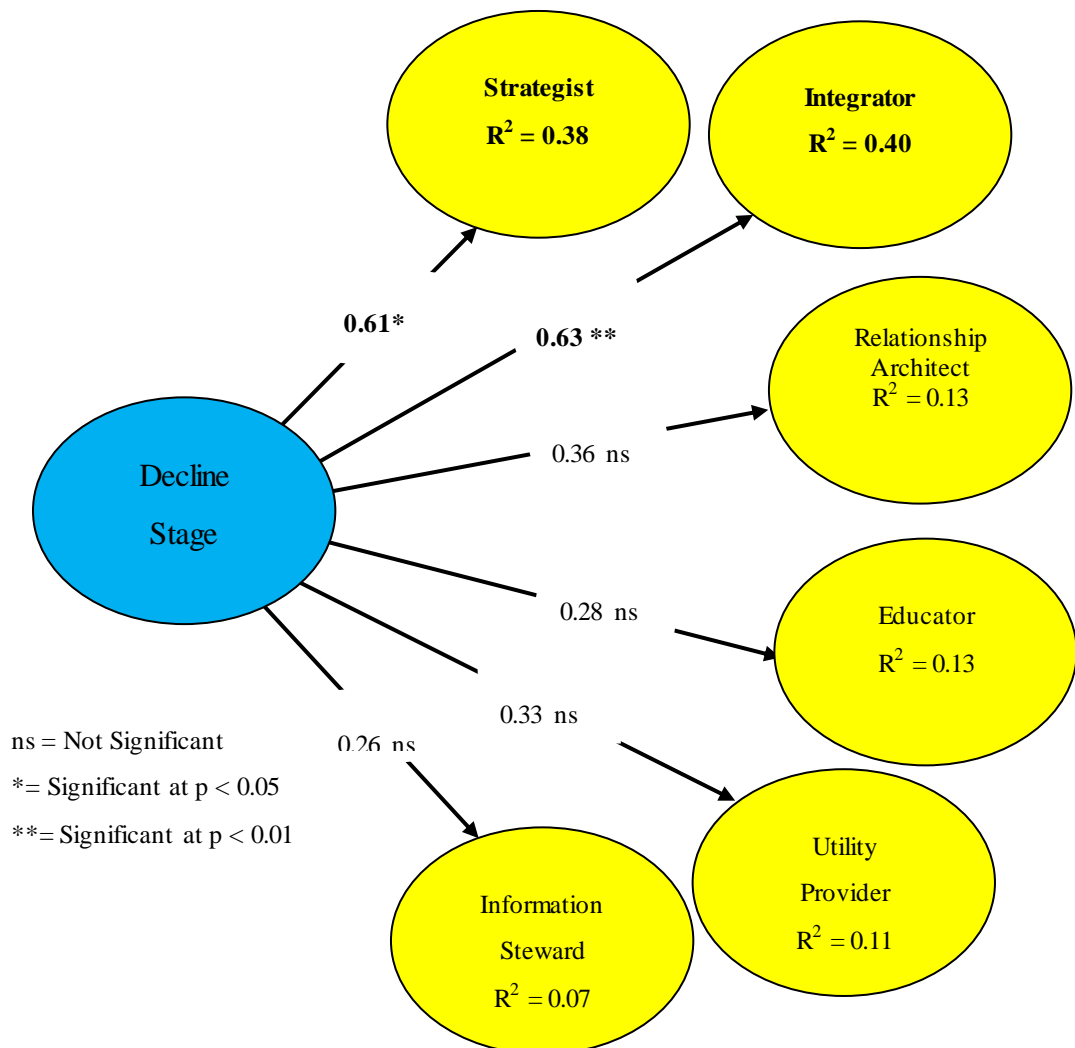


**Table 4.20 PLS Analysis Results for CIO Roles in Decline Stage (N=21)**

Path	Path Coefficient (β)	T-test	Sig.	P	R <sup>2</sup>	Model GoF
Decline Stage → Strategist Role	<b>0.61</b>	<b>1.80</b>	*	0.05	0.38	0.33
Decline Stage → Relationship Architect Role	0.36	0.69	ns	-	0.13	
Decline Stage → Integrator Role	<b>0.63</b>	<b>3.43</b>	**	0.01	0.40	
Decline Stage → Educator Role	0.28	0.72	ns	-	0.08	
Decline Stage → Information Steward Role	0.26	0.70	ns	-	0.07	
Decline Stage → Utility Provider Role	0.33	0.88	ns	-	0.11	

ns = Not Significant, \*  $p < 0.05$ , \*\*  $p < 0.01$

**Figure 4.5 The Relationship between Decline Stage and CIO Roles**



As shown in Table 4.20 and Figure 4.5, the Decline stage model presented only two significant relationships out of six—the roles of integrator and strategist respectively. The predictive power ( $R^2$ ) of the independent variables (CIO roles) indicates satisfactory values as most of them were over the minimum criterion of  $R^2$  (0.10) recommended by Falk and Miller (1992). In addition, the goodness of fit (0.33) for the Decline stage model was found to be moderate in comparison with baseline values ( $GoF_{small} = 0.1$ ,  $GoF_{medium} = 0.25$ ,  $GoF_{large} = 0.36$ ).

The results presented in Table 4.20 and Figure 4.5 provide support for the research hypothesis four (H4) as two out of three demand side roles were found to be more important for the CIOs in this stage than other roles.

### 4.3.4 Testing Research Hypotheses One

Research hypothesis one (H1) states the following: ‘*The configuration of the CIO roles differs across the five stages of the OLC*’. Building upon the results presented in sections 4.3.1 - 4.3.3, Table 4.21 summarises the CIO role configuration across the five OLC stages.

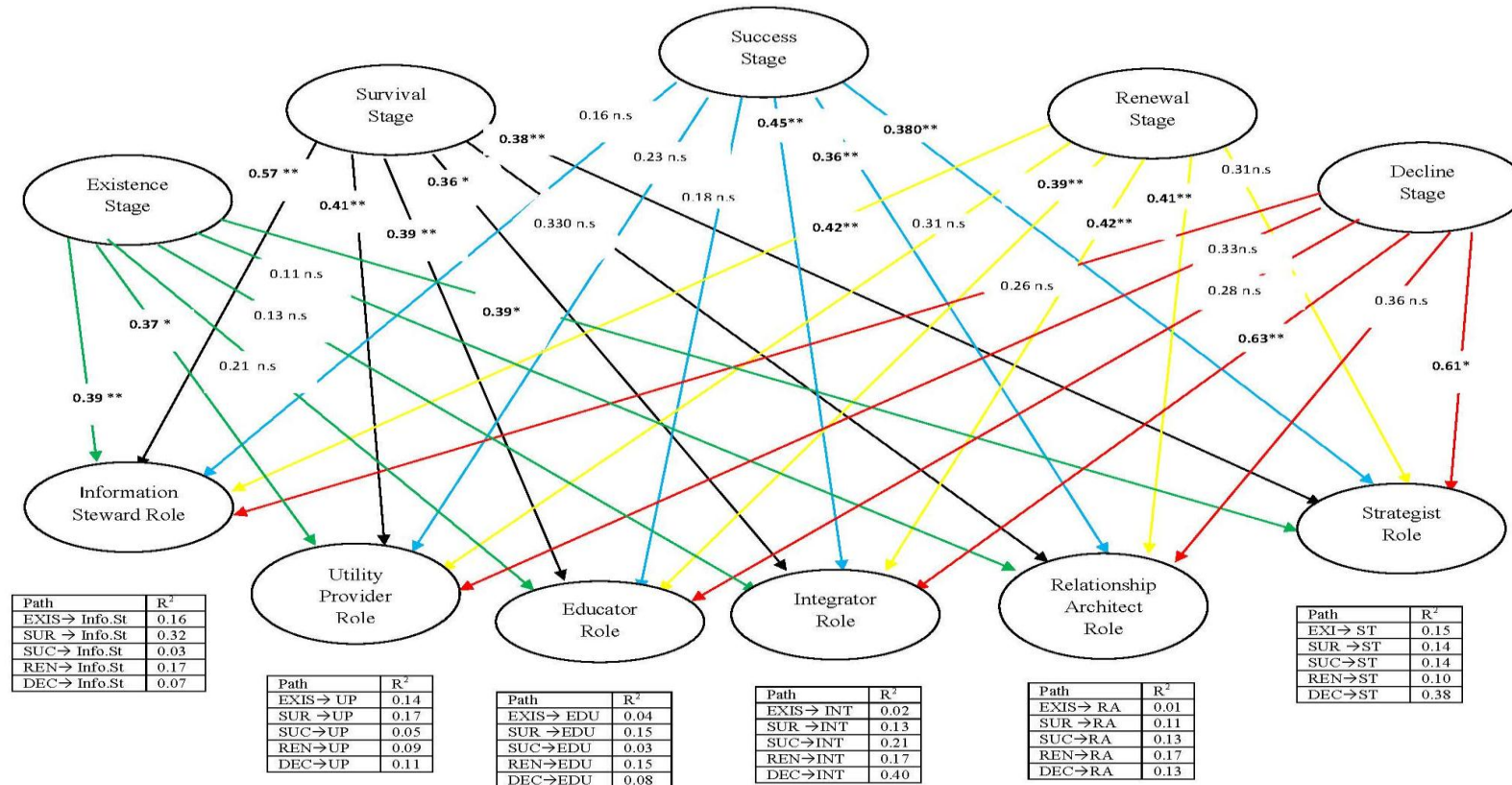
A summary illustration of the relationship between the five OLC stages and six CIO roles is presented in Figure 4.6.

**Table 4.21 CIO Roles Configuration across the OLC Stages**

OLC Stages	Existence	Survival	Success	Renewal	Decline
CIO Roles Configuration (Roles ordered according to their importance) in each stage of OLC	Information Steward	Information Steward	Integrator	Information Steward	Integrator
	Strategist	Utility Provider	Strategist	Integrator	Strategist
	Utility Provider	Educator	Relationship Architect	Relationship Architect	
		Strategist		Educator	
		Integrator			

As can be seen from Table 4.21 and Figure 4.6, the CIO roles configurations differed across the five OLC stages, hence, research hypotheses one (H1) can be accepted.

Figure 4.6 Summary of PLS Analysis Results

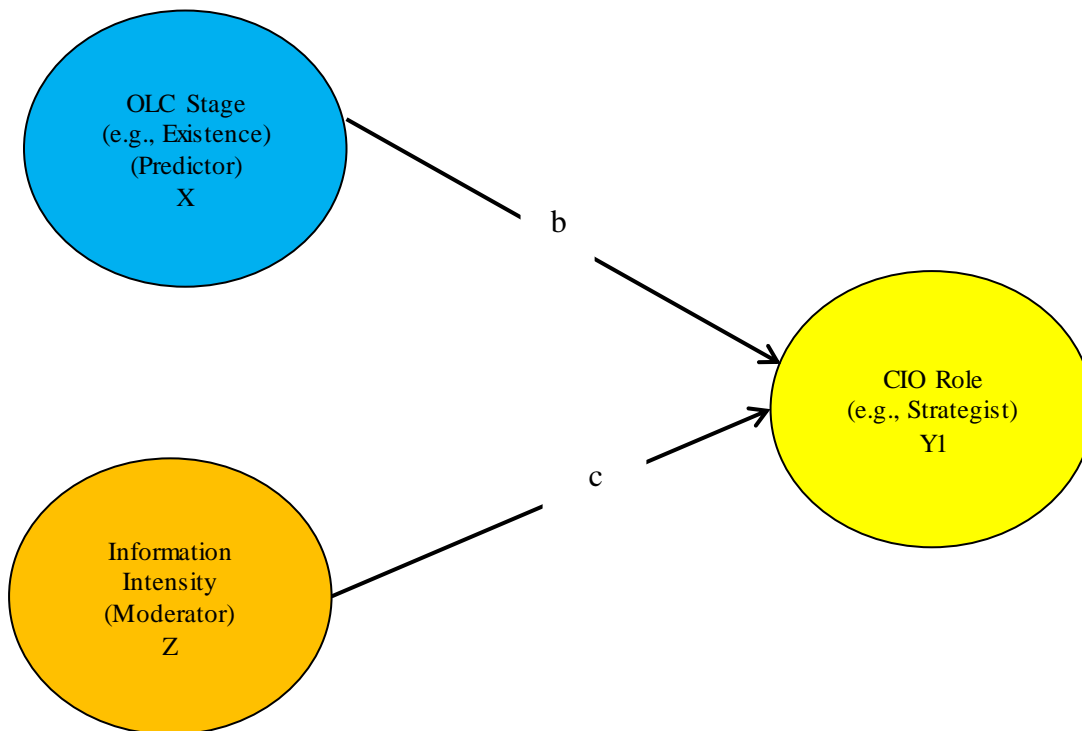


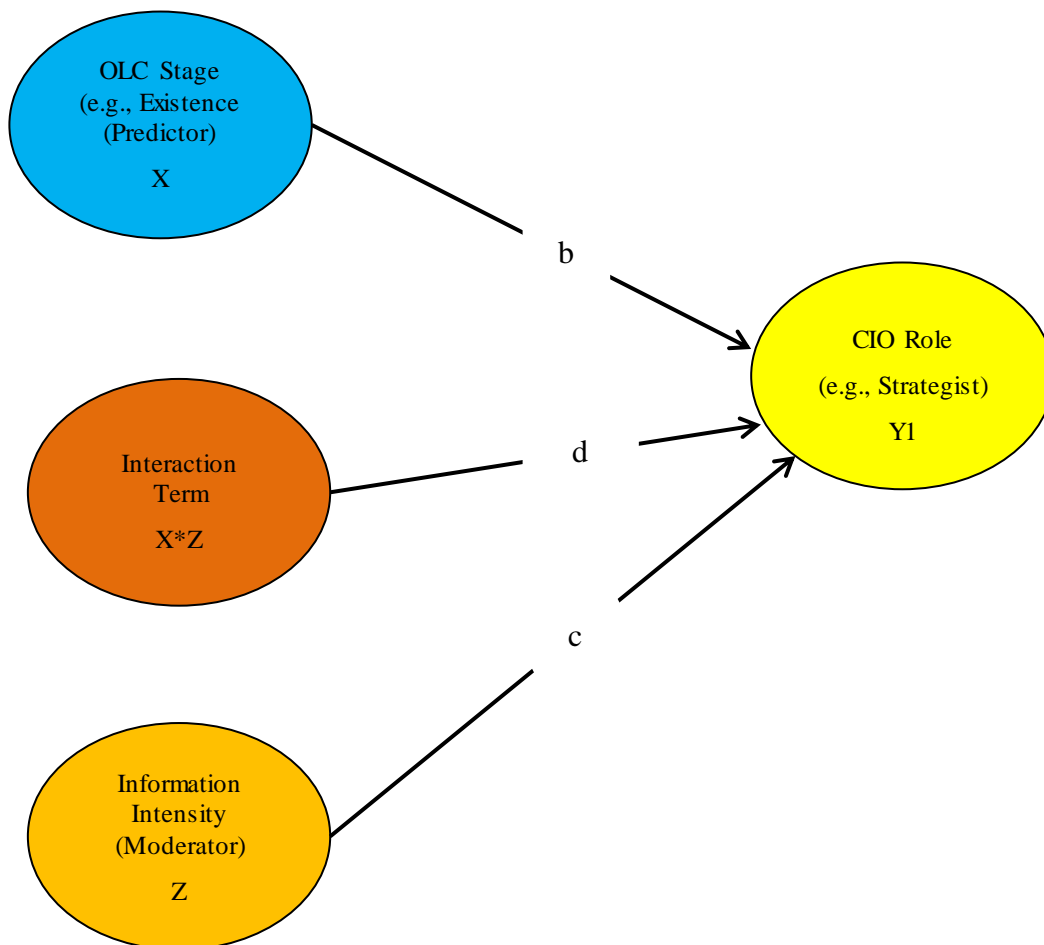
\*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$

### 4.3.5 Assessment of the interaction effect of information intensity

After investigating the direct path relationships between the OLC stages and the CIO roles, the next step assessed the interaction effect of the organisational information intensity as a moderating variable between independent variables (the five OLC stages) and dependent variables (the six CIO roles). Regarding that, hypothesis five (H5) is stated as, ‘*The organisational information intensity would moderate the relationship between the OLC stages and the CIO roles*’. In order to test the interaction effect of these two moderating variables, this research has used PLS product-indicator approach proposed by Chin et al. (2003) and the following recommendations provided by Henseler and Fassott (2010) and Carte and Russell (2003). Figure 4.7 and Figure 4.8 illustrate the analytical model for the main effect and for the interaction effect model based on product-indicator approach.

**Figure 4.7 Main Effect Model (Information Intensity)**



**Figure 4.8 Interaction Effect Model (Information Intensity)**

As the predictor variable (OLC stage) and the moderator variable (information intensity) are (1) reflective; (2) measured with Likert scales; and (3) its indicators were considered to be theoretically parallel, standardized indicators to a mean of zero and variance of one were used in this study to test the interaction effect. The standardization was calculated using IBM SPSS/19 for Windows. Then, the researcher formulated the interaction terms by multiplying the corresponding indicators of the predictor variable (OLC stage) and the moderator variable (information intensity).

According to Chin et al. (2003) formulating and testing for interaction effects using PLS requires following a hierarchical process similar to multiple regression where comparisons are made of the results of two models (i.e., one with and one without the interaction construct). The standardized path estimates from information intensity to the CIO roles path informs how a change in the level of the moderator construct Z (information intensity) would change the influence of the main construct X (OLC

stage) on the dependent construct Y (CIO roles). Thus, if OLC stage has an estimated beta effect of B on CIO role, a beta M for the interaction path can be interpreted as a beta change to B+M for the estimated path from OLC stage to CIO role when information intensity increases by one standard deviation from the baseline of zero.

Also the  $R^2$  for this interaction model was compared with the  $R^2$  for the “main effects” model, which excludes the interaction construct. The difference in  $R^2$ s is used to assess the overall effect size  $f^2$  for the interaction where .02, 0.15, and 0.35 have been suggested as small, moderate, and large effects respectively (Cohen 1988).

To assess the significance of the interaction and the main effect, a bootstrapping resampling approach was performed. From the original sample, 200 random samples were generated in order to test the significance of path estimates of the two models. A summary of the PLS results regarding the interaction effect of the information intensity is provided in Table 4.22. Tables DC1, DC2, DC3, D4, and D5 (Appendix D) provide the detailed results.

Table 4.22 PLS Analysis Results of the Interaction Effect of Information Intensity across the OLC Stages

Moderated Path	Existence			Survival			Success			Renewal			Decline		
	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$
OLC Stage * Info.Intens → Info.St	0.29 n.s	0.09	0.12	0.31 n.s	0.06	0.09	0.07 n.s	0.00	0.00	0.19 n.s	0.03	0.04	0.08 n.s	0.00	0.00
OLC Stage* Info.Intens → Ut.Prov	0.25 n.s	0.07	0.08	0.02 n.s	0.00	0.00	0.14 n.s	0.02	0.02	0.09 n.s	0.02	0.04	0.44 n.s	0.17	0.19
OLC Stage* Info.Intens → Edu	0.43**	0.19	0.21	0.12 n.s	0.01	0.01	0.29 n.s	0.08	0.10	0.49 n.s	0.05	0.06	0.10 n.s	0.00	0.00
OLC Stage* Info.Intens → Stra	0.26 n.s	0.00	0.00	0.23 n.s	0.02	0.02	0.21 n.s	0.04	0.05	0.37 n.s	0.10	0.11	0.10 n.s	0.02	0.04
OLC Stage* Info.Intens → Re.Arch	0.22 n.s	0.00	0.00	0.32 n.s	0.07	0.08	0.07 n.s	0.00	0.00	0.15 n.s	0.02	0.02	0.44 n.s	0.14	0.16
OLC Stage* Info.Intens → Integ	0.37 n.s	0.07	0.08	0.25 n.s	0.04	0.05	0.32 n.s	0.09	0.12	0.48 *	0.18	0.22	0.06 n.s	0.01	0.03

\*Significant at  $p < 0.05$  ; \*\*Significant at  $p < 0.01$

As can be seen from Table 4.22, only two significant interaction terms are detected from the thirty paths tested. These two significant interaction effects are related to the Educator role at Existence stage; and the other is related to the Integrator role at the Renewal stage.

In consideration of the Educator role at the Existence stage, the results of this study, as presented in Table D1 (Appendix D), give a standardized beta of 0.10 from Existence stage to Educator role, 0.38 from Information Intensity to Educator role, and an interaction effect of 0.43 with a total  $R^2$  of 0.29. Thus, this result implies that one standard deviation increase in Information Intensity will not only impact Educator role directly by 0.38, but it would also increase the impact of Existence stage to Educator role from 0.10 to 0.52 ( 0.10 + 0.42). Also, the change in  $R^2$  was substantial as it moved from 0.10 to be 0.29—which indicates that the interaction between the Existence stage and the Information Intensity has improved the explained Educator role variance. This result implies that the educator role of the CIO in firms in the Existence stage will be more important in firms with high information intensity.

With respect to the Integrator role at the Renewal stage, results revealed that one standard deviation increase in information intensity will not only impact Integrator role directly by 0.20, but it would also increase the impact of Renewal stage to Integrator role from 0.51 to 0.99 (0.51+ 0.48). The explained variance for the Integrator role represented by  $R^2$  increased substantially from 0.17 to 0.35, which indicates high contribution of the interaction term in explaining the variance of Integrator role. This result implies that the Integrator role of the CIO in firms in Renewal stage might be the most important role for the CIO in firms with high information intensity.

Results presented in Table 4.22 provide partial support for research hypothesis five (H5) as only two significant interactions terms were found out of thirty.



### 4.3.6 Assessment of the interaction effect of Strategic IT Vision

Due to the categorical nature of the strategic IT vision variable, the procedures to test its interaction effect on the relationship between the OLC stages and the CIO role were slightly modified. According to Henseler and Fassott (2010) categorical variables with more than two categories have to be transformed into sets of dichotomous variables. In order to dichotomize the strategic IT vision a dummy variable approach was applied to the data of this variable across the five OLC stages. Accordingly, the four categories of strategic IT vision (automate; informate-up; informate-down; and transform) were dissolved into three (Y-1) distinct 0/1-coded variables. The informate down was chosen to be the reference category. The dummy variables indicate the assigned category by a value of one. Research hypothesis six (H6) hypothesized the following: *'The organisational strategic IT vision would moderate the relationship between the OLC stages and the CIO roles'*. Product-indicator approach (Chin et al. 2003) and the guidelines provided by Henseler and Fassott (2010) were also used here to test the moderating effect of strategic IT vision. Figure 4.9 and Figure 4.10 illustrate the analytical model for the main effect and for the interaction effect model based on product-indicator approach.

**Figure 4.9 Main Effect Model (Strategic IT Vision)**

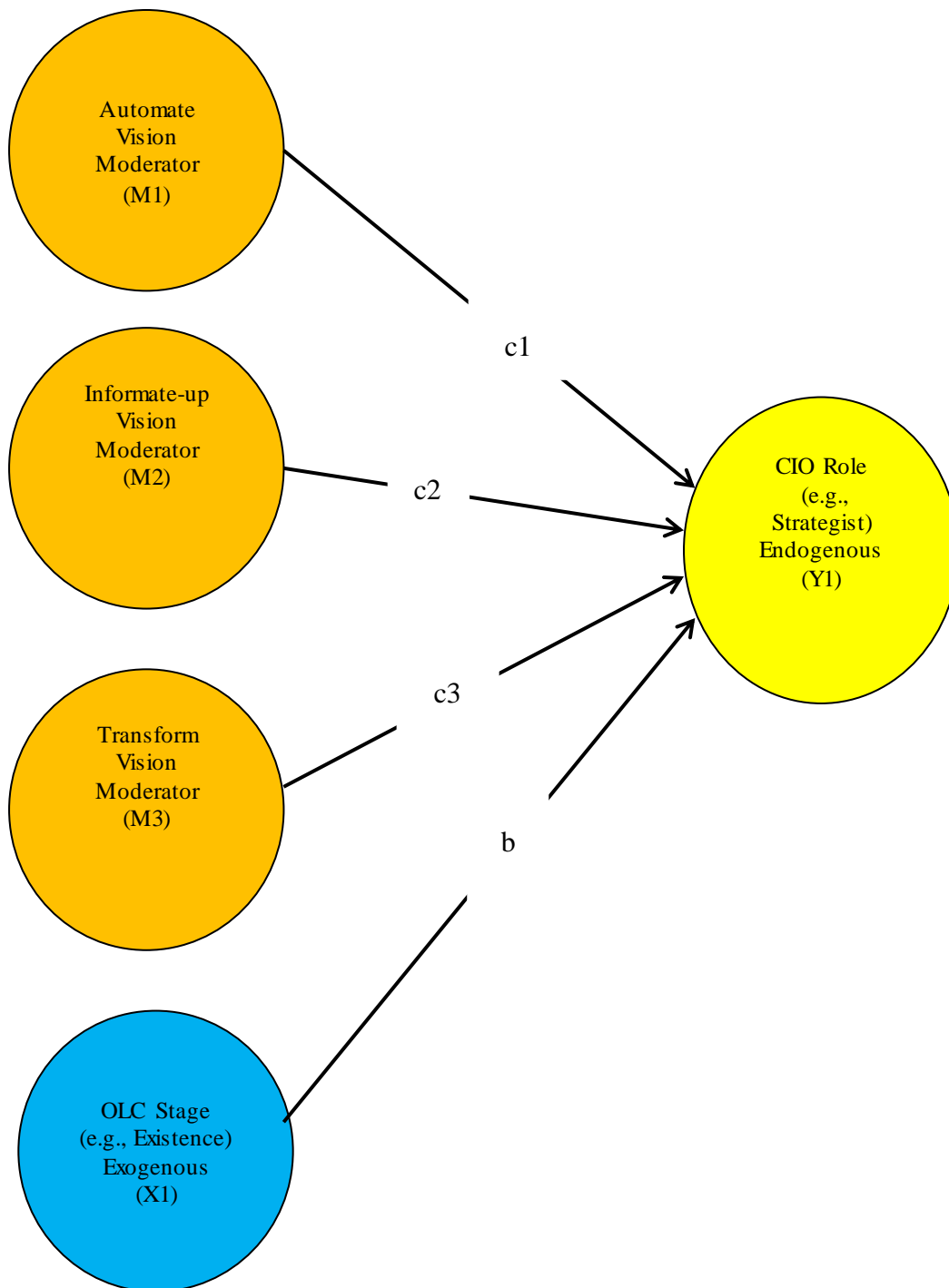


Figure 4.10 Interaction Effect Model (Strategic IT Vision)

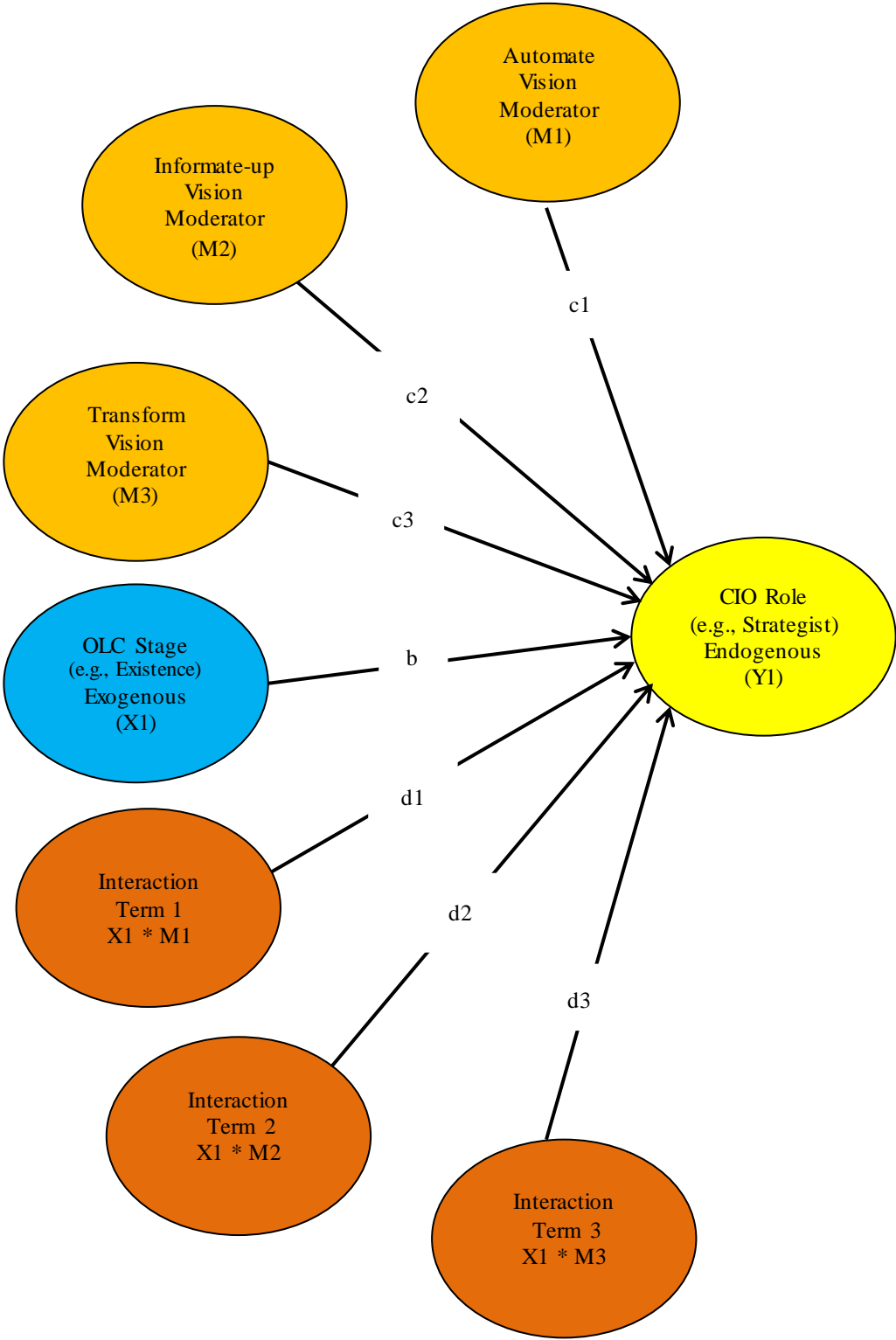


Table 4.23 summarizes the PLS results regarding the interaction effect of the strategic IT vision. Detailed results can be seen in Tables E1, E2, E3, E4, E5 (Appendix E). Results presented in Table 4.23 providing no support for research hypothesis 6 (H6) as no significant interaction effect was found for the strategic IT vision on the CIO roles across the five OLC stages.

Table 4.23 PLS Analysis Results of the Interaction Effect of the Strategic IT Vision across the OLC Stages

Moderated Path	Existence			Survival			Success			Renewal			Decline		
	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$
OLC Stage* Automate → Info.St	0.05 n.s	0.13	0.17	0.08 n.s	0.06	0.12	0.00 n.s	0.06	0.06	0.16 n.s	0.14	0.21	0.05 n.s	0.09	0.17
OLC Stage* Informate → Info.St	0.18 n.s			0.13 n.s			0.29 n.s			0.20 n.s			0.55 n.s		
OLC Stage* Transform → Info.St	0.16 n.s			0.25 n.s			0.03 n.s			0.33 n.s			0.31 n.s		
OLC Stage* Automate → Ut.Prov	0.08 n.s	0.05	0.07	0.06 n.s	0.18	0.25	0.07 n.s	0.01	0.01	0.07 n.s	0.14	0.16	0.01 n.s	0.02	0.03
OLC Stage* Informate → Ut.Prov	0.24 n.s			0.35 n.s			0.02 n.s			0.41 n.s			0.39 n.s		
OLC Stage* Transform → Ut.Prov	0.36 n.s			0.29 n.s			0.07 n.s			0.59 n.s			0.02 n.s		
OLC Stage* Automate → Edu	0.07 n.s	0.04	0.05	0.53 n.s	0.16	0.23	0.08 n.s	0.07	0.08	0.36 n.s	0.10	0.13	0.08 n.s	0.24	0.36
OLC Stage* Informate → Edu	0.21 n.s			0.34 n.s			0.24 n.s			0.73 n.s			0.51 n.s		
OLC Stage* Transform → Edu	0.07 n.s			0.06 n.s			0.19 n.s			0.85 n.s			0.56 n.s		

**Table 4.24 PLS Analysis Results of the Interaction Effect of the Strategic IT Vision across the OLC Stages (Continued)**

Moderated Path	Existence			Survival			Success			Renewal			Decline		
	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$	$\beta$	$\Delta^2$	$f^2$
OLC Stage* Automate → Stra	0.11 n.s	0.08	0.10	0.18 n.s	0.03	0.05	0.28 n.s	0.10	0.12	0.04 n.s	0.05	0.06	0.47 n.s	0.16	0.33
OLC Stage* Informate → Stra	0.16 n.s			0.08 n.s			0.19 n.s			0.09 n.s			0.11 n.s		
OLC Stage* Transform → Stra	0.16 n.s			0.13 n.s			0.26 n.s			0.32 n.s			0.54 n.s		
OLC Stage* Automate → Re.Arch	0.27 n.s	0.07	0.08	0.00 n.s	0.01	0.01	0.16 n.s	0.07	0.08	0.25 n.s	0.27	0.33	0.29 n.s	0.14	0.19
OLC Stage* Informate → Re.Arch	0.05 n.s			0.02 n.s			0.13 n.s			0.42 n.s			0.17 n.s		
OLC Stage* Transform → Re.Arch	0.13 n.s			0.15 n.s			0.25 n.s			0.39 n.s			0.46 n.s		
OLC Stage* Automate → Integ	0.13 n.s	0.06	0.08	0.42 n.s	0.12	0.15	0.25 n.s	0.11	0.15	0.37 n.s	0.10	0.14	0.15 n.s	0.01	0.02
OLC Stage* Informate → Integ	0.11 n.s			0.19 n.s			0.03 n.s			0.05 n.s			0.25 n.s		
OLC Stage* Transform → Integ	0.12 n.s			0.27 n.s			0.27 n.s			0.16 n.s			0.17 n.s		

## 4.4 Summary of Hypotheses Tests

To sum up, this chapter has presented the results of six hypotheses formulated based on previous literature and exhibited in the research model. The first four hypotheses (H<sub>1</sub>-H<sub>4</sub>) dealt with the relationship between the OLC stages and the CIO roles. The other two hypotheses (H<sub>5</sub> and H<sub>6</sub>) focus on the interaction effect of information intensity and strategic IT vision on the relationship between the five OLC stages and CIO roles. Table 4.25 summarizes the outcomes of each of these six hypotheses.

**Table 4.25 Summary of Hypothesis Testing**

H	Hypothesis	Results
H1	The configuration of the CIO roles differs across the five stages of the OLC	Supported
H2	The characteristics of early stages of the OLC (Existence and Survival) predominates operational/supply side roles of the CIO (Utility Provider, Information Steward, and Educator)	Supported
H3	The characteristics of late stages of the OLC (Success and Renewal), predominates strategic/demand side roles of the CIO (Integrator, Relationship Architect, and Strategist)	Supported
H4	The characteristics of decline stage of the OLC predominates strategic/demand side roles of the CIO (Integrator, Relationship Architect, and Strategist)	Supported
H5	Organisational information intensity moderates the relationship between the OLC stages and the CIO roles	Partially Supported
H6	Organisational Strategic IT vision moderates the relationship between the OLC stages and the CIO roles	Not Supported

## 4.5 Conclusion

The aim of this chapter was to prepare and analyse the data collected for this study in order to first summarise the respondents' demographics and then test the research hypotheses. Results indicate several important issues regarding the CIO role across the OLC stages. First, it was confirmed that the CIO role configurations do differ across the stages of the OLC. Second, findings revealed that the CIOs working at firms at the early stage of the OLC concentrate more on the operational or technical roles, while their counterparts working at firms in late and decline stages gave their attention to the strategic or business value-adding roles. Furthermore, almost no significant interaction effect was found for information intensity and strategic IT vision that was expected to moderate the relationship between the OLC stages and the CIO roles.

The next chapter discusses the results obtained from the data analysis presented in this chapter in relation to the existing literature. Answers to the research questions, justification, and linkages to refute or support previous literature will be provided as required in the next chapter.



## 5 Discussion and Synthesis

### 5.1 Introduction

This study investigates the different configurations of the CIO role across the stages of the OLC in the Australian context. To the researcher's knowledge, it is the first study to examine the impact of the OLC stage characteristics on the role configuration of the CIO. Results as presented in chapter four indicate that the configurations of the CIO role differ across the five stages of the OLC. Results also reveal that the CIOs tend to concentrate on the operational (or supply side) roles during the early stages of the OLC, whereas strategic (or demand side) roles are predominant in the late stages and the Decline stage of the OLC. Furthermore, no significant interaction effects have been found for organisational information intensity and the strategic IT vision as moderator variables for the relationship between the independent variables of this study (the OLC stages) and its dependent variables (the CIO roles). It is recognized that the results of any study remain somewhat vague without logical interpretation and discussion in the context of the existing knowledge. In this chapter the recommendations provided by Kothari (2004) are applied to make this chapter an essential component of the research process. Consequently, any relations and processes that underlie the findings are disclosed and justified. In addition, explanations of the usefulness and the utility of the research findings are been provided.

The aim of this chapter is to discuss and synthesize the findings of this study in terms of the three research questions articulated in Chapter 1 and put them into a wider context of the CIO's role within the organisation.

## **5.2 RQ1: Does the configuration of the CIO roles differ across the five stages of the OLC?**

The key findings presented in chapter four regarding hypotheses H2, H3, H4, and H5 indicate that the configurations of the CIO role differed across the five OLC stages (see Table 4.21 and Figure 4.6). This finding is consistent with previous leadership literature that investigated some leadership aspects across the OLC stages (see Table 2.15 ). For example, many researchers (Bonn & Pettigrew 2009; Chang 2009; Galbraith 1982; Roche 2009; Rothschild 1993; Ward 2003) found that the managers'/leaders' roles are varied according to the OLC stage of the organisation. This result also confirms that there is no typical type of CIO fit for all firms at all stages of the OLC. The finding of this study in that regard is in agreement with other recent CIO studies such as Chun et al. (2014), Weill and Woerner (2013) and Peppard et al. (2011) that identified different types of CIO in different types of firms.

## **5.3 RQ2: What is the 'make up' of the CIO role configuration at each stage of the OLC?**

The following section discusses the composition of the CIO role configuration at each stage of the OLC based on the findings of this research.

### **5.3.1 CIO role configuration at the Existence stage of the OLC**

At the Existence stage the organisation is typically small in size and young in age (Lester et al. 2003). It has an informal structure and crude information processing and decision making methods. The main concern of a firm at this stage is to be a viable entity via substantive innovation in product and/or services lines (Lester et al. 2003; Miller & Friesen 1984). Results of this study revealed that the role of the CIO seems to be crucial for the modern **new** organisation as the information age has become more technologically intensive than in the past. This refutes the previous belief that new organisations are dominated by the owner/founder who is a 'Jack-of-all-trades'. Gable and Raman (1992) found that CEOs in small businesses who are most likely the owner or founder of the firm tend to lack basic knowledge and awareness of information systems. Therefore, the lack of digital literacy of the founders/owners

might be the main reason for the importance of the role of the CIO in small modern organisations. Gregory (2006) observed that more small and midsize firms have recently created the new role for IT leadership.

Table 5.1 shows the three roles identified as the most important roles for the CIOs in the Existence stage: information steward; strategist; and utility provider.

It worth mentioning that this study used  $\beta$  and  $R^2$  to rank the important roles at each stage of the OLC and the factor loadings for their respective expectations within each role to rank these expectations from the highest to the lowest in importance. It is also worth mentioning that the findings of this study are not influenced by the diversification in industries regarding the transition speed from one stage of the OLC to the next as it is based on the current stage of the OLC for each organisation.

**Table 5.1 CIO Role Expectations in Firms at Existence Stage of the OLC**

CIO Role*	$\beta$	$R^2$	Item Code	Item Statement	Factor** loading	Role ID as in Broadbent & Kitzes 2005
Information Steward	0.39	0.16	Info.St3	Provide oversight for quality assurance of organisation data	0.86	Supply side role
			Info.St4	Ensure confidentiality and security of organisational data	0.81	
			Info.St2	Build and maintain an IT staff with skills sets that match the organisation's current and planned base	0.55	
Strategist	0.39	0.15	Stra5	Be initially involved in shaping the mission/vision of the organisation	0.95	Demand Side role
			Stra6	Be initially involved in business strategic planning and decisions	0.93	
			Stra4	Provide expertise on multidisciplinary business process improvement teams	0.60	
Utility Provider	0.37	0.14	Ut.Prov2	Establish electronic linkages throughout the organisation	0.87	Supply side role
			Ut.Prov4	Establish electronic linkages to external entities	0.85	
			Ut.Prov3	Ensure the organisations' users have adequate workstations (PCs/Laptops/Tablets) to accomplish their jobs	0.74	
			Ut.Prov1	Establish and maintain an IT department that is responsive to user request problems	0.69	

\*Roles ranked according to their importance (path coefficient  $\beta$  and  $R^2$ )

\*\*The expectations ranked within the roles based on their importance (factor loading)

The findings of this research regarding hypothesis H2 suggest that CIOs in firms at the Existence stage consider the role of information steward as a first priority in terms of security, organisational data quality, and IT staff recruitment. That might be due to their firm struggling to be viable through innovation in products and services (Lester et al. 2003). Hence, organisational data security and quality are crucial because it is a matter of life or death for their firms. Schuessler (2009) found that smaller organisations in fact do have a more comprehensive set of security countermeasures in place relative to their larger counterparts. Recruiting skilled IT staff is also considered from the CIO's point of view to be very important because

they are the seed of the firm's intellectual capital of IT to help the firm grow, survive, and remain competitive. Menlo Park (2013) reported the results of a survey conducted by one of the largest staffing companies in the USA which indicated that recruiting capable employees is the greatest challenge facing small businesses. Similarly, a recent international survey conducted by Deloitte involving more than 700 CIOs from 36 countries indicated that recruitment and retention of talent with the right skills to support new business demand is considered a significant issue for CIOs (Walsh 2013). Participation in the formulation of the firm's mission and strategic vision was the second main expectation of the CIO in firms at the Existence stage. This indicates that IT within the information age is considered a competitive weapon—even for new modern firms that have become highly technologically intensive. Schubert, Fisher and Leimstoll (2007) found that most small firms used IT to support innovation. That allows the CIO in small firms to play a strategic role in supporting the firm's innovativeness. The traditional technical role for the CIO as a utility provider was the third priority for the CIOs at this stage of the OLC. The technical role requires delivery of basic IT infrastructure, systems, and data and telecommunications capability. That represents the traditional role for the CIO to build and maintain IT infrastructure services that can be used to support firms' operational processes in an efficient manner.

The overall configuration of the role of the CIO during the Existence stage is operationally oriented as expected, however, the CIO in firms in the Existence stage has been found to have strategic touches. The present findings seem to be consistent with Gerth and Peppard's (2013) findings that show that CIOs tend to focus on supply side roles early in their 'taking charge' process. That is consistent with the observation by Brown (2010) who noticed that the CIO in small firms is closer to technology than CIOs in large firms. One possible explanation for that is as the firm has just been established, the CIO's main concern will be building the foundation of a reliable, sustainable, solid, dependable, and responsive IT organisation. The CIO will need to recruit skilled IT staff who are able to operate in a professional manner to secure the firm's data, and provide high quality information to decision makers. However, the CIOs at new organisations can play a central role as a business partner through participation in formulating the strategic orientation for the organisation and

ensuring the firm is on the right track in order to help their organisations leverage valuable opportunities for IT-based innovation and business process redesign. To conclude, the CIO role configuration at the Existence stage in terms of the two IT leadership domains suggested by Broadbent and Kitzis (2005) involves two-thirds supply side roles (information steward and utility provider) and one-third demand side role (strategist).

### **5.3.2 CIO role configuration at the Survival stage of the OLC**

Firms at the Survival stage tend to be older and larger and with a structure that is more formalized and functional, but less centralized. Their ownership and product lines are expanded or broadened to involve multiple shareholders and products. An initial appearance of formal information processing and decision making methods can be seen at this stage of the OLC. The main goal is to achieve rapid growth in sales in order to generate enough revenue to stay competitive (Lester et al. 2003; Miller & Friesen 1984). As a consequence, the CIO role configuration has expanded in terms of the number of roles and the variety of expectations in comparison to the previous stage of the OLC. Yet, as expected in hypothesis H2, the overall composition of the CIO role is still closer to the operational roles (information steward, utility provider, and educator) than to the business or strategic roles (strategist and integrator).

Two new roles are added to the configuration of the CIO role at this stage: the educator and the integrator. The educator role requires a CIO to be seen as an IT missionary, who provides insight and understanding about key information technologies to raise top management savviness, awareness, and appreciation of IT and help them to make appropriate judgments about the business value of IT and wise IT investment decisions (Smaltz et al. 2006). The reason why this role becomes important at this stage could be rooted in the rapid growth in sales intended to be achieved for firms in the Survival stage of OLC and how the IT capabilities can generate significant business value for the firm. The other new role is the integrator role that requires the CIO to play a leadership role to electronically link the firm's internal and external parts together and ensure that every department, function and division within the firm can define, integrate and exploit information in order to

achieve some sort of unity and to gain synergy that helps the firm achieve its goal. Table 5.2 presents the CIO role expectations at the Survival stage.

To conclude, the Survival stage CIO in terms of the two IT leadership domains suggested by Broadbent and Kitzis (2005) involves two-thirds supply side roles (information steward, utility provider, and educator) and one-third demand side roles (strategist and integrator).

**Table 5.2 CIO Role Expectations in Firms at Survival Stage of the OLC**

CIO Role	$\beta$	$R^2$	Item Code	Item Statement	Factor loading	Role ID as in Broadbent & Kitzes 2005
Information Steward	0.57	0.32	Info.St3	Provide oversight for quality assurance of organisation data	0.88	Supply side role
			Info.St2	Build and maintain an IT staff with skills sets that match your current and planned base	0.76	
Utility Provider	0.41	0.17	Ut.Prov2	Establish electronic linkages throughout the organisation	0.86	Supply side role
			Ut.Prov4	Establish electronic linkages to external entities	0.86	
			Ut.Prov1	Establish and maintain an IT department that is response to user request problems	0.48	
			Ut.Prov3	Ensure the organisations' users have adequate workstations (PCs/Laptops/Tablets) to accomplish their jobs	0.47	
Educator	0.39	0.15	Edu1	Champion digital literacy throughout the organisation	0.90	Supply side role
			Edu2	Provide insight to the top management team/executives staff on new emerging technologies	0.86	
Strategist	0.38	0.14	Stra6	Be initially involved in business strategic planning and decisions	0.91	Demand side role
			Stra5	Be initially involved in shaping the mission/vision of the organisation	0.80	
			Stra4	Provide expertise on multidisciplinary business process improvement teams	0.74	
			Stra2	Develop/maintain metrics that measure the value of IT to the organisation	0.72	
			Stra3	Direct IT-enabled business process restructuring/reengineering	0.66	
			Stra1	Develop and implement a strategic IT plan that aligns with the organisation's business plan	0.58	
Integrator	0.36	0.13	Integ3	Develop/acquire an electronic document management capability throughout the organisation	0.82	Demand side role
			Integ2	Migrate organisation from legacy, department applications to cross-department, integrated application	0.80	
			Integ4	Develop an understanding of the industry delivery process	0.72	
			Integ1	Direct efforts to build integrated delivery systems	0.62	

### 5.3.3 CIO role configuration at the Success stage of the OLC

At this stage the firms become larger, mature, and bureaucratic. They have a functional and much more formal and decentralized structure, and utilize



sophisticated information processing. They seek to protect what has been gained through conservative innovation rather than targeting new territory (Lester et al. 2003; Miller & Friesen 1984). Results of this study regarding hypothesis H3 indicated that the CIO in organisations at the Success stage is completely business- or strategic-oriented as the operational or supply side roles have become less important.

There are several possible explanations for this finding. The first could be rooted in splitting the IT leadership role into two positions (CIO and CTO) in large organisations as the configuration of the CIO roles have become too overwhelming for a single person (Beatty et al. 2005). According to that standpoint, the CIO will be looking after the strategic aspects of IT while the Chief Technology Officer (CTO) manages the operational side of IT. The second possibility for the strategic focus for the CIO in the Success stage of the OLC might be due to the delegation of the daily operations to middle IT managers in large organisations typically in the Success stage of the OLC, allowing the senior executives to focus on planning and strategy (Lester et al. 2003). The third possibility for the absence of the operational supply side role for the CIO at the Success stage could be rooted in outsourcing where the firms rely on external vendors to deliver operational IT services. An IT outsourced service strategy allows CIOs in organisations at the Success stage to pay more attention to their core business processes while delegating time consuming IT processes to external agencies.

In addition to the lower importance of the CIO supply side roles at the Success stage of the OLC, some other important changes were evident. The integrator role of the CIO becomes the first priority for the CIO at the Success stage, followed by the strategist role, then the relationship architect role. This could be rooted to the heterogeneity of legacy information systems that most large organisations suffer from which, in turn, leads to a sort of organisational rigidity (Reddy & Reddy 2002). Kukalis (1991) asserted that the larger the organisation, the greater the need for co-ordination and integration. Supporting multidisciplinary business process improvement teams, aligning IT strategy with the corporate strategy, and defining IT metrics would be the second priority for CIOs in organisations at the Success stage. Since IT as a strategic weapon has become more important, the need to play a

business strategist role by the CIO has been raised and moved the CIO from the back room to executives' table. Literature has continuously emphasized the importance of the role of the CIO as a business strategist (also referred to as innovator or change agent); for example Feeny (1997); McLean and Smits (2003); Chun and Mooney (2009); and Weiss and Adams (2010). The role of the CIO as relationship architect has become more prominent with firms focusing on building relationships with external (suppliers) and internal (non-IT senior executives) stakeholders in order to obtain the best prices and services from IT vendors and achieve mutual understanding among the top management team. The CIO's relationship with internal and external stakeholders has been identified as one of the important features for the modern CIO (Agarwal & Beath 2007; Chen & Wu 2011; Feeny et al. 1992; Jones et al. 1995). Table 5.3 presents the CIO role expectation at the Success stage of the OLC. To conclude, the role of the CIO in the Success stage is completely strategic or business oriented as their role configuration involves three strategic roles: integrator, strategist, and relationship architect.

**Table 5.3 CIO Role Expectations in Firms at Success Stage of the OLC**

CIO Role	$\beta$	$R^2$	Item Code	Item Statement	Factor loading	Role ID as in Broadbent & Kitzes 2005
Integrator	0.45	0.21	Integ2	Migrate organisation from legacy, department applications to cross-department, integrated application	0.84	Demand side role
			Integ4	Develop an understanding of the industry delivery process	0.79	
			Integ1	Direct efforts to build an integrated delivery systems	0.72	
Strategist	0.38	0.14	Stra4	Provide expertise on multidisciplinary business process improvement teams	0.85	Demand side role
			Stra1	Develop and implement a strategic IT plan that align with the organisation's business plan	0.85	
			Stra3	Direct IT-enabled business process restructuring reengineering	0.79	
			Stra2	Develop/maintain metrics that measure the value of IT to the organisation	0.75	
Relationship Architect	0.36	0.13	Re.Arch2	Negotiate with vendor IT organisation on new external contract proposals	0.91	Demand side role
			Re.Arch1	Provide executives oversight for all IT contracts with external vendors	0.86	
			Re.Arch3	Ensure IT contracts with external vendors remain within scope and budget	0.85	

### 5.3.4 CIO role configuration at the Renewal stage of the OLC

Firms at the Renewal stage become the largest considered so far (in comparison to previous stages) and tend to be bureaucratic. They have a divisional or matrix structure and use much more decentralized decision making methods. Ownership has become quite widely dispersed. There is diversification in their product-lines, and they use complex information processing. The main concern for firms at this stage is to renew themselves by achieving rapid growth in sales with a policy of occasional acquisition in order to stay competitive (Lester et al. 2003; Miller & Friesen 1984). Results of this study regarding hypothesis H3 indicates that the Renewal stage CIO has a unique configuration of strategic and operational roles imposed by the nature of

this stage of firm growth. It seems that the integrator role is the first priority for the CIO at the late stages of the OLC. This result may be explained by the nature and the characteristics of large organisations in terms of size and structure which justify the CIO playing that role to ensure value-added integration, coherence and congruence among and between internal and external systems, divisions, branches, and stakeholders toward the firms' intended direction (Bergstrand 2012; Beveridge 2012; Chen & Preston 2007). The importance of the integrator role for the CIO in firms at the Renewal stage can also be justified by the nature of the firm's IS legacy which is described as a heterogeneous composite of disparate, often large scale information systems established over time, each fulfilling a particular competitive need at a particular point in time (Reddy & Reddy 2002).

The results also revealed that the importance of the CIO role as an information steward will be parallel with the importance of the integrator role. Securing huge quantities of organisational data, ensuring the quality of the information provided to the decision makers, and recruiting new skilled IT staff who are able to renew the firm will be as important for the Renewal stage CIO as is systems integration. The importance of the information steward role can be justified by the survey results reported recently in CIO magazine (*State of the CIO 2013*) that indicated the CIOs' concerns regarding threats to enterprise security and data management solutions.

The next priority is building relationships with key insiders (CEO and other non-IT senior executives) by sharing the control of IT contracts and outsiders (vendors) in order to obtain better offers that keep the IT budget under control. Recent survey results (*State of the CIO 2013*) suggest that IT leaders are increasingly taking action to build and solidify relationships with their non-IT stakeholders.

The educator role for the CIO seems to be the last element in the CIO role configuration at the Renewal stage. Bridging the IT cognitive gaps between the CIO and other senior executives was found by Jablolkow, Jablolkow and Seasock (2010) to be a key leadership challenge facing CIOs in large firms today. In the Renewal stage CIOs need to perform two types of educational activities in order to promote IT as an agent of business transformation or renewal (Kadlec 2004). The first is

facilitating educational activities that are important in providing the top management team (TMT) with the required knowledge regarding emerging technologies and how these can renew business (TMT mental model building). The second type of educational activities are empowerment activities—which are important in providing the top management team with the required knowledge regarding the established technologies used and how the firm can invest in these technologies to renew its business (TMT mental model maintenance). The absence of the traditional role of the CIO as a utility provider could also be justified with three possible reasons (split IT leadership role, delegation of operational activities to middle IT managers, and IT services outsourcing) as in the previous OLC stage of Success (Beatty et al. 2005; Gefen et al. 2011b; Lester et al. 2003). The absence of the strategic role of the CIO at this stage is somewhat surprising. It is difficult to explain this result, but it might be related to the attempt of the firm to repeat previous successful strategies or it could be due to the low credibility of the IT leaders in playing the part of such an important business leader at this critical stage of the OLC. Table 5.4 shows the CIO role expectation at the Renewal stage of the OLC. To conclude, the roles configuration of the Renewal stage CIO in terms of the two IT leadership domains is almost evenly split between the demand side CIO roles and supply side CIO roles.

**Table 5.4 CIO Role Expectations in Firms at Renewal Stage of the OLC**

CIO Role	B	R <sup>2</sup>	Item Code	Item Statement	Factor loading	Role ID as in Broadbent & Kitzes 2005
Integrator	0.42	0.17	Integ2	Migrate organisation from legacy, department applications to cross-department, integrated application	0.78	Demand side role
			Integ1	Direct efforts to build an integrated delivery systems	0.73	
			Integ4	Develop an understanding of the industry delivery process	0.65	
			Integ3	Develop /acquire an electronic document management capability throughout the organisation	0.51	
Information Steward	0.42	0.17	Info.St4	Ensure confidentiality and security of organisational data	0.86	Supply side role
			Info.St2	Build and maintain an IT staff with skills sets that match your current and planned base	0.85	
			Info.St3	Provide oversight for quality assurance of organisation data	0.66	
Relationship Architect	0.41	0.17	Re. Arch	Provide executives oversight for all IT contract with external vendors	0.91	Demand side role
			Re.Arch2	Negotiate with vendor IT organisation on new external contract proposals	0.91	
			Re.Arch3	Ensure IT contract with external vendors remain within scope and budget	0.75	
Educator	0.39	0.15	Edu1	Champion digital literacy throughout the organisation	0.95	Supply side role
			Edu3	Assist top management team/executives staff in improving their digital literacy	0.84	
			Edu2	Provide insight to the top management team /executives staff on new emerging technologies	0.77	

### 5.3.5 CIO roles configuration at the Decline stage of the OLC

Organisational Decline refers to ‘an organisational state of poor adaptability, consistently depleting resources, reduced legitimacy, and high vulnerability’ (Carmeli & Sheaffer 2009) . The organisation in this stage of the OLC experiences a reduction in profit and a loss of market share due to the firm’s inability to meet the external demand of any of the OLC stages (Lester et al. 2003; Miller & Friesen 1984). Bonn and Pettigrew (2009) pointed out that declining organisation focus on two types of activities: retrenchment activities such as cost and asset reductions; and recovery response activities such as acquisitions, the development of new products and markets and increased market penetration.

Results regarding hypothesis H4 suggest that CIOs in declining Australian organisations have given the integrator and the strategist roles all of their attention. The absence of the operational roles for the CIO at this stage might be justified by the fact that declining firms tend to focus on retrenchment activities which leads them to IT outsourcing. Researchers in information systems propose that reducing costs is one of the main reasons why firms outsource their IT (Gefen et al. 2011b; Jawahar & McLaughlin 2001; Smith et al. 1998). Outsourcing IT services in order to reduce the IT spend shifts the role of the CIO from IT service provider to business integrator (Gefen et al. 2011b).

On the other hand, the recovery activities require CIOs to play a business strategist role to present IT as a modern way of creating new products and/or services that retain current customer loyalty and attract new customers, or to update the dated organisational processes that are no longer satisfactory. This result is in agreement with the finding of Hanks et al. (1993) who argued that the corporate mission and strategy would be the main business task for leaders at the Decline stage. Table 5.5 provides the CIO role expectations at the Decline stage of the OLC. To conclude, the Decline stage CIO role configuration is wholly on the demand side of CIO roles, however, it excludes the relationship architect role.

**Table 5.5 CIO Role Expectations in Firms at Decline Stage of the OLC**

CIO Role	$\beta$	$R^2$	Item Code	Item Statement	Factor loading	Role ID as in Broadbent & Kitzes 2005
Integrator	0.63	0.40	Integ4	Develop an understanding of the industry delivery process	0.89	Demand side role
			Integ1	Direct efforts to build an integrated delivery systems	0.82	
			Integ3	Develop/acquire an electronic document management capability throughout the organisation	0.78	
			Integ2	Migrate organisation from legacy, department applications to cross-department, integrated application	0.67	
Strategist	0.61	0.38	Stra2	Develop/maintain metrics that measure the value of IT to the organisation	0.90	Demand side role
			Stra1	Develop and implement a strategic IT plan that align with the organisation's business plan	0.86	
			Stra4	Provide expertise on multidisciplinary business process improvement teams	0.80	
			Stra3	Direct IT-enabled business process restructuring reengineering	0.75	
			Stra5	Be Initially involved in shaping the mission/vision of the organisation	0.59	

#### **5.4 RQ3: Does the organisational information intensity and the strategic IT vision moderate the relationship between the OLC stages and the CIO roles?**

The third research question aims to explore whether the organisational information intensity and strategic IT vision have any interaction effect that moderates the relationship between the independent variables of this study (the OLC stages) and the dependent variables (the CIO roles). The product-indicator approach (Chin et al. 2003) was used to test the interaction effect of these two organisational contingencies.

With regard to the organisational information intensity, it is anticipated in hypothesis H5 that the information intensity of the firm would moderate the relationship between the OLC stages and the CIO roles, it is assumed that the higher the



information intensity of the firm the more attention is given by the CIO to the demand side role and vice versa for the low information intensity. Of thirty (30) interaction effect terms for the information intensity tested in this study, two significant interaction terms were found. The first implies that the educator role of the CIO in firms in the Existence stage will be more important in firms with high information intensity. Thong and Yap (1995) found that small firms in more information-intensive sectors are more likely to adopt IT than those in less information-intensive sectors. That means the CIOs working at small, high information intensity firms such as banks, insurance, travel agencies or healthcare centres need to educate the CEOs and other senior executives more than their counterparts working at small, low information intensity firms such as mining or manufacturing. The adoption of IT within small, high information intensity firms requires the CIO to raise the profile of IT and play the role of socialization agent in order to gain the support of senior executives. A possible explanation for this might be that the nature of the products or the services presented by high information intensity firms requires executives to have a higher level of IS knowledge and more information about the emerging technology than the top management team (TMT) at low information intensity firms. Consequently, the CIO role as an educator becomes more important at small firms with high information intensity than those with low information intensity.

The second significant interaction term was related to the integrator role at the Renewal stage which implies that the Integrator role of the CIO in firms in the Renewal stage will become significantly important in firms at the Renewal stage with high information intensity. Reddy and Reddy (2002) argued that over time large firms accumulate a multitude of disparate, often large-scale information systems, each fulfilling a particular competitive need at a particular point in time. Therefore, the role of the CIO as an integrator in mature high information intensity firms becomes a necessity in order to avoid the organisational rigidities and to increase IT agility. This result may also be explained by the fact that Renewal stage firms that are very large in size and have multidivisional structures are in serious need of collaboration and teamwork to enhance innovation and creativity (Lester et al. 2003; Miller & Friesen 1984). Therefore, the CIO role as an integrator who is able to achieve coherence and

congruence internally and externally by integrating all internal and external systems for mutual benefit of the firm is required at this stage, especially if it is a highly information-intensive firm.

As far as the strategic IT vision is concerned, this study has anticipated in Hypothesis H6 that the strategic IT vision articulated by the organisation would moderate the relationship between the OLC stages and the CIO roles. It is assumed that a CIO working in an organisation that articulated higher vision for IT (e.g., transformational or informate-down) might pay more attention to the strategic or demand side roles, whereas those working within organisations that viewed IT as a tool for automation or informate-up could concentrate on the operational or supply side roles. Despite the high effect size ( $f$ ) and the change in  $R^2$ , the results revealed no significant interaction effect for the organisational IT vision in all 30 interaction terms tested.

Overall, despite the large and medium effect sizes ( $f$ ) and the large change in  $R^2$ , the results of the tests for interaction effects of information intensity and strategic IT vision were not encouraging. It seems possible that these results are due to the small samples in each stage of the OLC that are all below 50 cases. This is consistent with the result of Chin et al. (2003) who also failed to observe any significant interaction in small samples. These results, therefore, need to be interpreted with caution because later studies with bigger samples might find differing/significant results. However, (Rosenthal 1979, 1991) argued that non-significant interaction effects should not be ignored as they could lead to significant results when combined into meta-analyses at a later date.

## 5.5 Synthesis

After discussing the results of this study, it is useful to draw some observations from combining them to form a coherent whole. Some interesting observations can be drawn from the combination of the results of this study, as summarised in

Table 5.6 and discussed as follows:

- 1- The CIO role configurations differ across the OLC stages which means that the characteristics of each stage provides different contingencies for the CIO to play the roles that are required for that situation.
- 2- The content of each role at each stage in terms of the importance of its expectations differed as well. For example, if we compare the strategist role expectations ranking at the Existence stage with the strategist role expectations ranking at the Decline stage it can be seen that although the strategist role is important in both stages, it is much wider and the expectations priority is different in the Decline stage.
- 3- At the early stage of the OLC (Existence and Survival), the supply side or the operational roles of the CIO seems to be more important than the demand side or strategic roles.
- 4- Contrary to the early stages, in the late stages of the OLC (Success and Renewal) the CIO perceives the demand side or the strategic roles to be more important than the supply side or operational roles.
- 5- The CIO role at the Decline stage seems to resemble the late stage of the OLC more than the early stage, which means that a more strategic role is required by the CIO in the Decline stage of the OLC.
- 6- It seems that as the firm grows in size and age to reach late stages of its life cycle (Success and Renewal stage) the integrator role will be very crucial to integrate its widely separated parts, systems, and stakeholders.
- 7- Similarly, the educator role seems to be more important in firms that are experiencing rapid growth (Survival and Renewal stages), which required a transformational process imposed on the CIO to pay more attention to educating top management team members and key employees regarding how to facilitate the firm's growth using the current IT infrastructure and provide them with information about the emerging technologies that can be used for that goal.
- 8- Playing the role of relationship architect by the CIO seems to be more important at later stages of the OLC (Success and Renewal), especially with external vendors.
- 9- The traditional role of the CIO as utility provider seems to be important only in the early stages of the OLC (Existence and Survival), which might be due to splitting the IT leadership role, or delegating the operational activities to

the IT middle managers, or due to IT services outsourcing at late stages of the OLC.

- 10- Overall, the importance of the six CIO roles based on their frequency in each of the five stages of the OLC can be ranked as follows: Strategist and Integrator (found to be important in four stages); Information Steward (found to be important in three stages); Relationship Architect, Educator, and Utility Provider (found to be important in two stages).
- 11- Similarly, the importance of the CIO roles expectations based on the frequency of their respective items over the five stages of the OLC can be ranked as follows (see the last column in Table 5.6: Stra4, Integ1, Integ2, Integ4 (4stages); Stra1, Stra2, Stra3, Integ3, Info.St2, Info.St3 (3 stages); Stra6, Re.Arch1, Re.Arch2, ReArch3, Edu1, Edu2, Info.St4, Ut.Prov1, Ut.Prov2, Ut.Prov3, Ut.Prov4 (2 Stages); Edu3 (1 Stage)
- 12- With respect to the interaction effect of the organisational information intensity and the strategic IT vision, it seems that the small sample size may have prevented this study from detecting more significant interaction effect for both moderating variables. This indicates the need to treat this result with caution.

**Table 5.6 The CIO Role Expectations across the OLC Stages**

CIO Role	Item	CIO Role Expectations	OLC Stages					Item Freq.
			Existence Stage	Survival Stage	Success II Stage	Renewal Stage	Decline Stage	
Strategist	Stra1	Develop and implement a strategic IT plan that aligns with the organisation's strategic business plan		✓	✓		✓	3
	Stra2	Develop/maintain metrics that measure the value of IT to the organisation		✓	✓		✓	3
	Stra3	Direct IT-enabled business process restructuring/reengineering		✓	✓		✓	3
	Stra4	Provide expertise on multidisciplinary business process improvement teams	✓	✓	✓		✓	4
	Stra5	Be initially involved in shaping the mission/vision of the organisation	✓	✓			✓	3
	Stra6	Be initially involved in business strategic planning and decisions	✓	✓				2
Relationship Architect	ReArch1	Provide executive oversight for all IT contracts with external vendors			✓	✓		2
	ReArch2	Negotiate with vendor IT organisations on new external contract proposals			✓	✓		2
	ReArch3	Ensure IT contracts with external vendors remain within scope and budget			✓	✓		2
Integrator	Integ1	Direct efforts to build an integrated delivery system.		✓	✓	✓	✓	4
	Integ2	Migrate organisation from legacy, department applications to cross-department, integrated applications		✓	✓	✓	✓	4
	Integ3	Develop/acquire an electronic document management capability throughout the organisation		✓		✓	✓	3
	Integ4	Develop an understanding of the industry delivery process		✓	✓	✓	✓	4
Educator	Edu1	Champion digital literacy throughout the organisation		✓		✓		2
	Edu2	Provide insight to the top management team/executives staff on new emerging technologies		✓		✓		2
	Edu3	Assist top management team/executives staff in improving their digital literacy				✓		1
Information Steward	Info.St2	Build and maintain an IT staff with skill sets that match your current and planned technology base	✓	✓		✓		3
	Info.St3	Provide oversight for quality assurance of organisational data	✓	✓		✓		3
	Info.St4	Ensure confidentiality and security of organisational data	✓			✓		2
Utility Provider	UtProv1	Establish and maintain an IT department that is responsive to user requests/problems	✓	✓				2
	UtProv2	Establish electronic linkages throughout the organisation	✓	✓				2
	UtProv3	Ensure the organisation's users have adequate workstations (PCs/Laptops/Tablets) to accomplish their jobs	✓	✓				2
	UtProv4	Establish electronic linkages to external entities (customers, suppliers, partners, etc.)	✓	✓				2

## 5.6 Conclusion

This chapter presented a discussion of the findings in relation to the results of the data analysis for the structural model evaluated in the data analysis (chapter 4). The findings are discussed in relation to the three general questions stated in the research theoretical framework presented in chapter two. Findings of this study suggest that the configurations of the CIO role differ across the five stages of the OLC. Results also revealed that CIOs tend to concentrate on the operational (or supply) side roles during the early stages of the OLC, whereas strategic (or demand) side roles are predominant in the late stages and the Decline stage of the OLC. Furthermore, no interaction effect was found for the information intensity and the strategic IT vision that significantly affects the direction or the strength of the relationship between the OLC stages and the CIO roles. In light of previous literature, these results have been discussed and synthesized in providing answers to the respective research questions investigated in this study.

The next chapter will provide a conclusion to this study by summarising its key findings and describing how this study contributes to theory and practice; and acknowledges the limitations and provides some suggestions for future studies based on the gaps identified in this study.

## 6 Conclusion and Implications

### 6.1 Introduction

The arrival of the information age has made the role of the chief information officer (CIO) as vital as other C-suite managers. Since the emergence of the CIO role in the early 1980s, much has been written about it, however, this role remains ambiguous. This ambiguity indicates a lack of theory building regarding the CIO role in an organisation. This research proposes that studying the CIO role without considering the organisational context has led to this ambiguity about the role of the CIO. Therefore, this study attempted to clarify the ambiguity surrounding the CIO's role by investigating it within the context of the organisational life cycle (OLC). The purpose of this chapter is fourfold as follows: (1) to provide conclusions with regard to the research objectives; (2) to summarize the central claims of the analysis and situate the analysis in terms of its contribution to theory and practice; (3) to provide some recommendations for three types of stakeholders: CIOs, top management team, and CIOs' education and training providers; and (4) to suggest some areas for future research based on the gaps in the literature identified in this study.

The structure of this chapter is as follows. Section 6.2 gives a summary of the five research objectives and how they were achieved. Section 6.3 discusses the contributions of this study to theory and practice. The limitations of this research, along with suggestions for future research, are addressed in section 6.4. Finally, closing remarks to this study are provided in section 6.5.

### 6.2 Conclusion about each research issue

This research commenced with the aim of identifying a research gap that would be worthwhile investigating for a PhD project. To that end, an extensive review of the CIO literature was conducted using the available data-bases, search engines, and lists of references from research articles published since 1980. Then, the secondary data from the existing literature were organized into themes according to their content identified from skim readings of their abstracts and key words. Next, careful reading

for all for this literature was carried out. It was noticed that the impact of the organisational contingencies that can shape the CIO role in an organisation was a theme less researched by IS scholars in this particular area—and, subsequently, that led to determining the research gap domain. Careful examination of the leadership literature regarding the role of the CEO and other senior executives led to the choice of the integrated variable of the organisational life cycle (OLC) as a contingency that might impact the CIO role in an organisation. Another two organisational variables (organisational information intensity and strategic IT vision) were chosen to investigate their interaction effect on the relationship between the OLC and the CIO role. The research gap that was the focus of this study was then clarified and the purpose of this research was determined. Based on that, a number of objectives were set. The following sections summarise how each of these objectives has been achieved.

### **6.2.1 Research Objective One: Identify the CIO Role configuration**

The CIO, general management, and leadership literature was reviewed extensively in order to identify the current role configurations of leaders or managers, including the CIO. The revision process covered a period of time starting from the late 1960s to the present. In total, 27 classic and modern CIO and/or manager's role configurations were identified. The number of roles included in these role configurations ranged from three to ten roles. A decision was made to exclude the classical or the general role configurations due to the distinctiveness of the CIO role and the availability of modern role configurations that deal specifically with IT leaders. A rational comparison was conducted on 23 CIO role configurations identified from the literature between 1981 and 2010 (see Table 2.11). A decision was made to adopt the CIO roles developed by Smaltz et al. (2006) as a dependent variable of this study (see Table 2.13). A justification of why the researcher chose this CIO role configuration was provided in chapter two.



### **6.2.2 Research Objective Two: Identify the OLC Model**

After identifying the research dependent variable, the researcher's attention was directed to identifying a suitable operational model of OLC that represents the independent variable in this study. An extensive review of the literature revealed at least 38 OLC models developed since 1962 to describe organisational growth (see Table 2.). The model developed by Lester et al. (2003) was chosen after careful examination and comparison of these 38 OLC models. Some reasons were provided in chapter two to justify the OLC model chosen. The OLC model was used as a taxonomic tool to classify and group the CIOs' firms into the stages of the OLC prior to testing the relationship between the CIOs' firm stage and the six CIO roles. Each stage of the OLC was treated as a dependent variable in the statistical analysis conducted in this study.

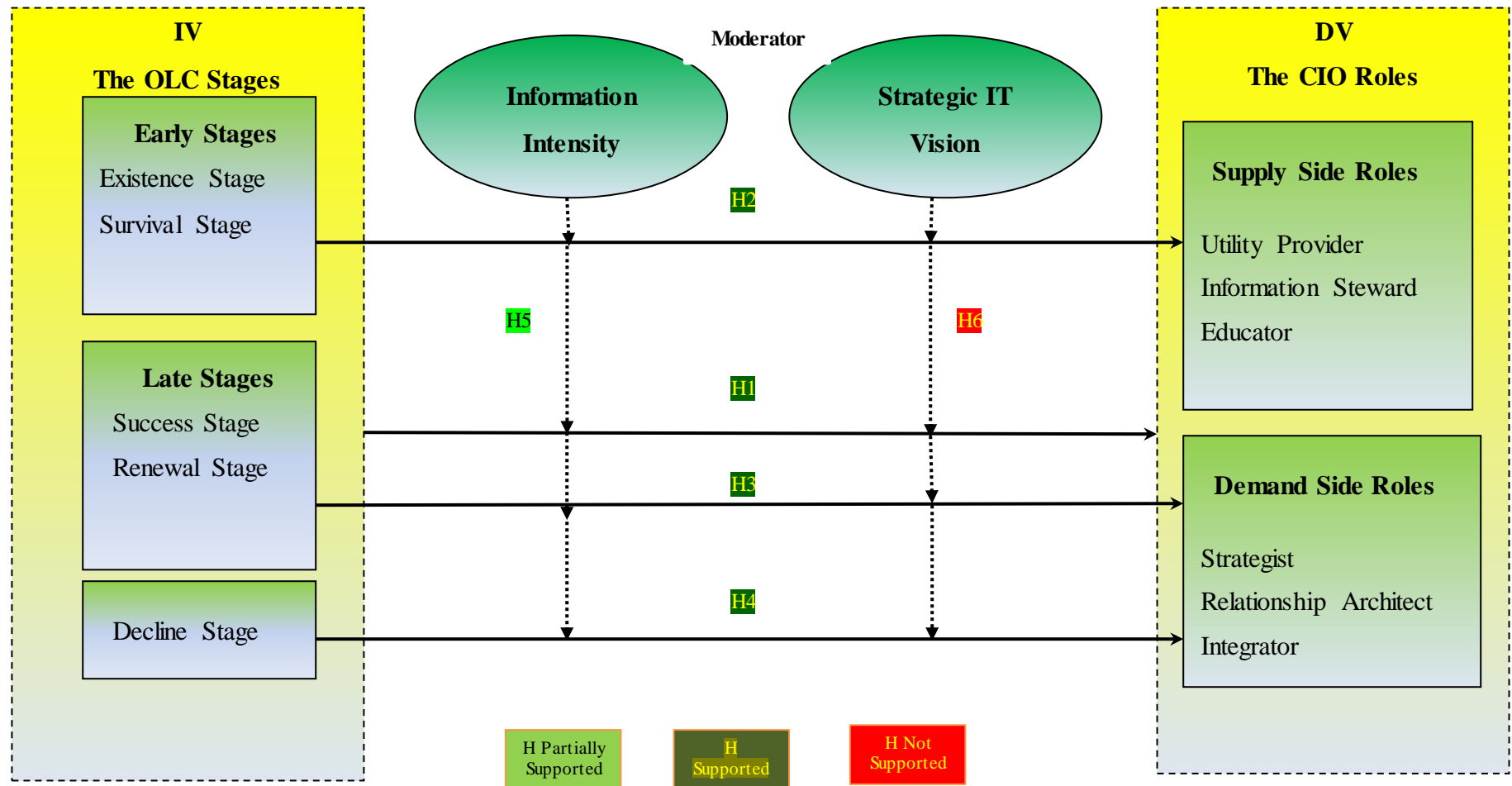
### **6.2.3 Research Objective Three: Selecting the Moderating Variables**

To move beyond the direct relationship between the OLC stages and the CIO roles some moderating variables were considered. Examining the interaction effect of a moderating variable allows us to know the conditions and the context under which the relationship between the dependent and the independent variables may change. Hence, two moderating variables were chosen for that purpose: organisational information intensity, and organisational strategic IT vision. These two moderators were chosen after a thorough review of the IS literature in general and the CIO literature in particular. With regard to organisational information intensity, this study has adopted the view and the measurement suggested by Busch et al. (1991) and Teo and King (1997). The IT vision typology presented by Schein (1992) was the categorical variable by which the CIOs firms' vision of IT were identified. The rationale behind the selection of these two moderating variables was provided in chapter two.

#### **6.2.4 Research Objective Four: Build the Theoretical Model and Formulate the Hypotheses**

Following the identification of the specific research variables in the proposed research model, a set of six hypotheses was formulated based on the previous literature. Each of these hypotheses dealt with a particular research question. In that regard, the OLC stages were grouped in three distinctive categories: early stage (Existence and Survival); late stage (Success and Renewal); and decline stage. The six CIO roles were grouped in two categories according to the two IT leadership domains: supply side roles (utility provider, information steward, and educator) and demand side roles (strategist, relationship architect, and integrator). The first hypothesis examined whether the CIO roles configuration differs at each stage of the OLC. The next three hypotheses investigated the relationship between the three categories of OLC stages (early, late, and decline) and the two categories of CIO roles (supply and demand side roles). The last two hypotheses tested the interaction effects of the organisational information intensity and the strategic IT vision. All of the research hypotheses were depicted in the theoretical model of this research. Figure 6.1 illustrates the theoretical model of this research.

Figure 6.1 Theoretical Model of this Research



### **6.2.5 Research Objective Five: Test the Proposed Model**

Testing the theoretical model of this study was achieved through several important steps. First, a thoughtful examination of the available measures of the key research construct was conducted to choose the instruments that best fit with the research aim. Second, a pre-test was carried out on the initial research questionnaire to refine it before conducting the survey. Third, the refined questionnaire was used to collect the data for this research through three waves of survey administration in order to reach an acceptable response rate. In total, 174 valid and usable questionnaires were collected from Australian senior IT executives from different industries. Fourth, data were entered into the computer, and then screened and cleaned prior to conducting any statistical analysis. Next, a preliminary statistical analysis was carried out including: descriptive analysis, non-response bias, and sample representativeness. After that, the validity and the reliability of the key research constructs were checked using SEM/PLS. Following that, a cluster analysis was conducted to classify the CIOs' firms into the five stages of the OLC. Finally, the structural model of each of the five stages of the OLC was assessed using SEM/PLS—first without the moderating variables and then with them included in the structural model. Consequently, the configurations of the CIO roles at each stage of the OLC were identified with and without the interaction effects of the moderators. Building upon the results of the hypothesis testing, the research questions were answered.

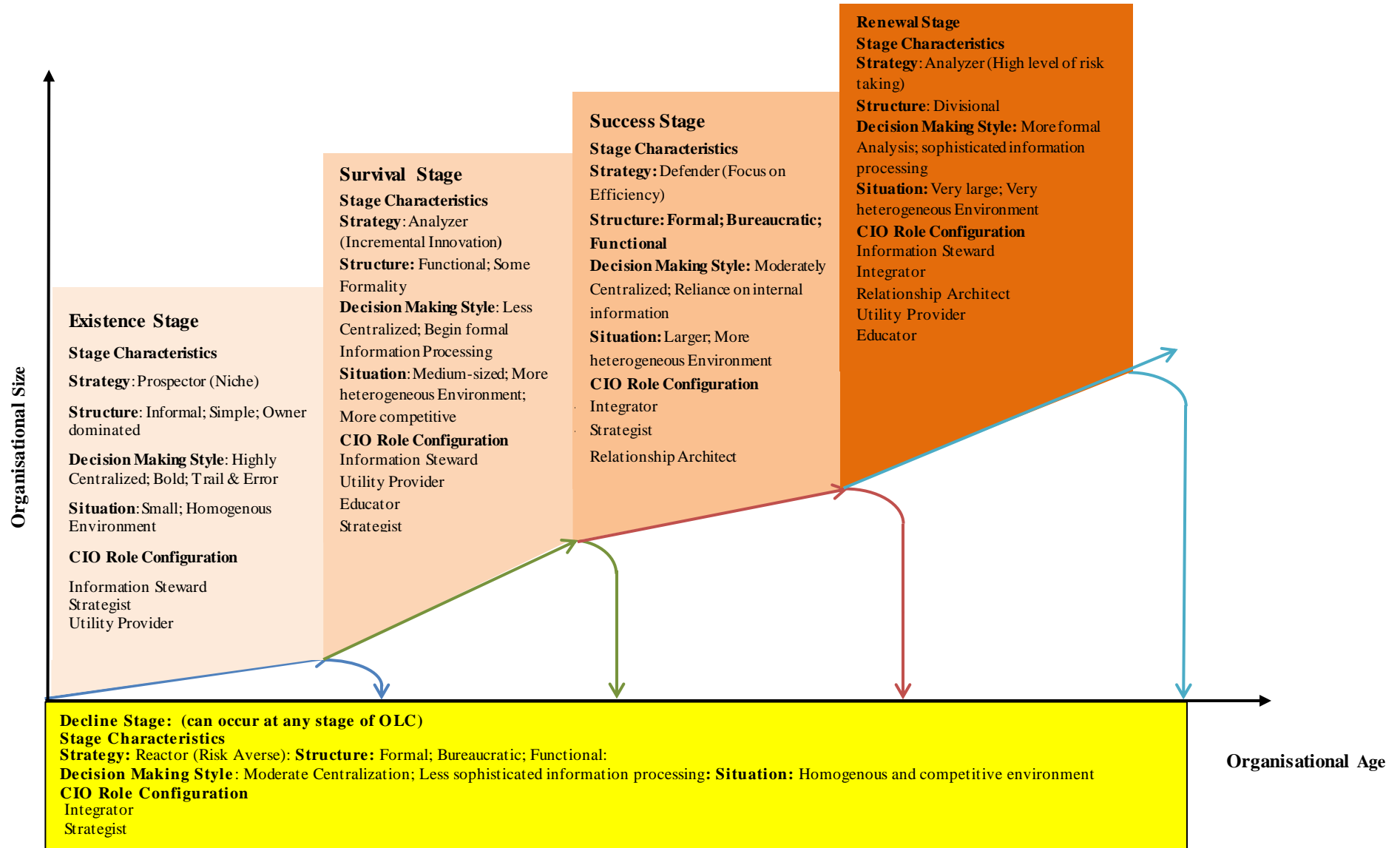
### **6.2.6 Concluding Remarks and Summary of Results**

This study developed a contingency framework for the CIO roles across the organisational life cycle stages. As detailed throughout the preceding chapters, the researcher conducted an extensive review of the literature regarding the current CIO role configurations and the current OLC models in order to build the research model and formulate hypotheses. Then, a positivist research paradigm was chosen to collect data through a large scale cross sectional survey and analyse the collected data using a quantitative approach based on SEM. Findings indicate that the configurations of the CIO role differ across the five stages of the OLC. Results also revealed that the CIOs tend to concentrate on the operational (or supply) side roles during the early stages of the OLC, whereas strategic (or demand) side roles are predominant in the late stages and the decline stage of the OLC. Furthermore, no significant interaction

effects have been found for organisational information intensity and strategic IT vision as moderating variables for the relationship between the independent variables (the OLC stages) and the dependent variables (the CIO roles) of this study.

Figure 6.2 illustrates the integrated OLC- CIO role framework based on the findings of this study.

**Figure 6.2 The Integrated OLC-CIO Role Framework**



## 6.3 Study Contributions

This research made several important contributions to existing knowledge and practice and adds substantially to our understanding regarding the role of the CIO in different stages of the OLC.

### 6.3.1 Contribution to Knowledge and Theory

This study has contributed to the existing knowledge, theory, and the growing body of literature in a number of ways:

- a) Addressed the current gap in the body of the knowledge regarding the CIO role at different stages of the OLC by developing and testing an integrated framework to identify the configuration of CIO roles at each stage of the OLC based upon the results of this empirical study. The integrated OLC-CIO role framework developed in this study can be used to establish stage-wise thinking and improve situational awareness for modern CIOs in relation to their role in a way that increases the organizational value gained from IT.
- b) Conducted a comprehensive review of the literature in terms of the current OLC models and CIO role configurations which highlighted some significant gaps in the literature. The literature in both the OLC and CIO research domains was reviewed and discussed in a thorough manner and a general summary of the existing literature in the two fields (OLC and CIO) was provided.
- c) Provided support for CIO role theory on two central issues: CIOs are fulfilling a configuration of roles, not just one specific role; and the duality of the CIO position which means that the configuration of the CIO roles can be grouped into two major categories: supply side roles and demand side roles. The results of this study provide evidence on the configuration of roles that the CIO performs and the nature of these roles (technical vs. strategic) which contributes to clarifying the ambiguity surrounding this central role.
- d) Provided support for the OLC theory in terms of its applicability which is empirically confirmed by this research. The findings of this study have added further currency to the OLC theory and refute the criticism presented by some researchers toward its applicability.

- e) Presented two comprehensive definitions for each of the chief information officer (CIO) and organisational life cycle (OLC) based on previous literature. The identification of the main element of the existing definitions for each of the two terms (OLC and CIO) in the literature has contributed to presenting two new definitions that incorporate all of these elements in a comprehensive one. This has contributed to clarifying the meaning of these two terms (OLC and CIO) which have been described in the literature as ill-defined.
- f) Clarified some of the ambiguity surrounding the CIO role by shedding some light on the relationship of organisational contingencies integrated within the OLC with the CIO role. This study addressed the CIO role at the micro level—not at the macro level as in much of previous research. Therefore, results of this study are expected to be more detailed, more beneficial, and more realistic for all stakeholders.
- g) Assessed the interaction effects of two important organisational contingencies (information intensity and strategic IT vision) that were anticipated to affect the direction and/or strength of the relationship between the dependent variable of this study (the CIO roles) and the independent variable (the OLC stages). Estimating the interaction effects are a crucial issue in IS research because it explains the conditions and context under which the relationships between the independent and dependent variables may vary.
- h) Modified and validated a more generic CIO roles expectations instrument that can be used with confidence in a wide range of industries rather than solely in the healthcare industry in which it was developed. From a theoretical perspective, the results of the re-examination of this instrument will assess the rigor and the extent of confidence in CIO role theory. Additional investigation from the operational point of view facilitates generalizability and consistency of measurements over time and context.
- i) Validated a recent OLC instrument that can be used as a taxonomic tool to classify organisations into five stages of the OLC. This might help to facilitate the grouping of firms into the OLC stage based on a tentative and objective approach rather than self-categorisation as used in some prior OLC research.
- j) Provided another example of how to use SEM as a contemporary method to validate instruments in two major fields: organisational theory, and IS. This can



guide researchers in both fields of study to follow this researcher's steps to validate more instruments in order to augment research methodological rigor.

- k) Demonstrated that component-based structural equation modelling (also referred to as partial least square PLS/SEM) is not a distributional-free approach as indicated in the literature, as the results of this study were highly improved after normalizing the empirical data collected in this study. It seems that it may not be possible to bring highly skewed/kurtosis (or noisy) data into a linear relation without moderate or severe over fitting/normalizing of the data, as evident in this research.

### **6.3.2 Contribution to Practice**

This study provides some useful practical implications for key stakeholders as follows.

#### **6.3.2.1 Implications for the CIOs**

The integrated OLC-CIO role framework will provide practicing and training CIOs with a roadmap of effective roles and positive organisational attitudes required for a sustainable IT leadership career. Aligning CIO roles with the current situation of the firm represented by the growth stage of their firm might increase the CIO's effectiveness and then the value created for a firm from IT. CIOs should identify their firm's stage of growth and play the appropriate roles based on the results of this study. A self-assessment that CIOs can use to identify the OLC stage of their firms is provided in Appendix F.

Results of this study confirmed the need for both domains of IT leadership (supply or operational side roles and demand or strategic side roles) and this indicates that IT knowledge, although vital, is not enough to oversee IT in modern organisations. Therefore, CIOs nowadays are required to expand their skills to include leadership skills and business knowledge. If either of these two components is absent from the CIO it indicates a real lack in IT leaders' knowledge required to gain value from IT within their organisation. CIOs can overcome this lack of knowledge by either undertaking specialist courses such as MBA or IT; or engaging consultants who are able to guide their business-related decisions and/or IT related decisions.

### **6.3.2.2 Implication for Management of Organisations**

The Integrated OLC-CIO role framework will provide management with an effective tool to recruit and retain the most suitable CIO for the firm who has the right skills and capabilities that allow them to play the required roles configuration (supply) to meet the organisation's current situation (demand). Top management should consider the organisation's stage of growth when recruiting IT leaders as not all types of IT leaders can play the configuration of roles required at this particular stage of the OLC.

Management of firms also should consider both technical/operational and strategic/business knowledge, along with the extent of the alignment between the firm's current OLC stage and the configuration of roles that should be applied by the CIO as a criterion to appraise CIO performance.

### **6.3.2.3 Implications for CIO educational and training providers**

The education/training programmes delivered by specialist institutions responsible for preparing CIOs can be enhanced by the key findings of this study regarding the need to align the configuration of the CIO roles with the organisation's stage of growth. Education/training programmes by specialist institutions should emphasize the situational awareness and stagewise thinking in their programs to prepare a new breed of IT leaders who can be named as situational CIOs.

Furthermore, providers of education and/or professional development for CIOs need to incorporate both technical/operational and strategic/business knowledge and skills in their programmes—as confirmed by this study.

## **6.4 Limitations and Future Research**

### **6.4.1 Limitations of the study**

Despite the key findings emanating from this study in terms of extending the CIO role literature by identifying CIO roles configurations across the stages of the OLC, there are some limitations—as with most studies into organisational behaviour. These limitations are noted as follows:

- .
- a) The sub-samples size (cases within each stage of the OLC) range from 21 to 44 cases which can be considered relatively small, though analysable, so caution must be applied regarding the findings of this study. Similarly, the low sub-group samples size obtained may have prevented this study from detecting more significant interaction effects for both moderating variables (the information intensity and the strategic IT vision). This indicates the need to treat the results with caution. Furthermore, the current study was unable to analyse the collected data using covariance-based structural equation modelling approach (CBSEM) due to low sample size. Therefore, the sample size constraint guided the statistical analysis of the data of this study to the component-based structural equation modelling (PLS/SEM), which might be considered by some conservative researchers as having less rigour than the covariance-based approach (CBSEM). Most recently, the criticism of those conservative researchers about PLS were refuted by Henseler, Dijkstra, Sarstedt and Ringle (2014).
  - b) Identification of the organisational life cycle stage was based on the perception of a single manager (the CIO) rather than considering multiple perceptions (e.g. all top management team), hence, the findings of this study regarding the relationship between the OLC stages and the CIO roles should be treated with caution and investigated in greater detail from the multiple perspectives of all of the top management team.

#### **6.4.2 Recommendations for future research**

The limitations and caveats mentioned above and the gaps identified by this research warrant the need for further work to be undertaken in the following areas:

- a) A further study could assess this crucial topic with larger samples which may improve the results' statistical power and reduce statistical error. Also, it would be interesting to assess the interaction effects of the information intensity and the strategic IT vision with larger samples as this research has anticipated that these

two variables might moderate the relationship between the OLC stages and CIO role.

- b) Further study of the configuration of CIO roles across the OLC stages that considers multiple perspectives of all of the top management team is needed, especially with the identification of the OLC stage.
- c) Further experimental investigations are needed to explore how CIOs can contribute to managing the transition from one stage of the OLC to another.
- d) Future studies should apply some neglected classic managerial roles configurations such as Adizes (1976), Quinn and Rohrbaugh (1981) and Hart and Quinn (1993) in order to provide another perspective and further insights regarding CIO roles.
- e) Further research is also required to explore whether new role expectations for the CIO may have become relevant after 2006 when the original instrument used in this study was developed, as new technologies have emerged as dominant technologies since 2006 including cloud computing, big data, green IT, and business intelligence.
- f) Finally, it is recommended that future studies be conducted to reconsider the PLS/SEM assumption that it is a distributional-free approach as it may not be possible to bring highly skewed/kurtosis data into a linear relation without moderate or severe over fitting/normalizing as evident in the statistical analysis conducted in this study.

## 6.5 Closing Remarks

To conclude, this study has examined the CIO role configuration across the stages of the organisational life cycle (OLC). It has been argued that as the configuration of the integrated contingencies underlying each stage of the OLC (e.g., situation, structure, size, age, information processing) differs, so does the CIO role configuration. This study basically aimed to identify the CIO role configuration throughout the five stages of organisational growth. A theoretical model was developed and a set of hypotheses was formulated based on the literature. A survey methodology was used to collect quantitative data to measure the independent variable (five stages of OLC) and the dependent variable (six CIO roles). PLS/SEM

was used to empirically examine the hypothesised relationships in the proposed model.

Results revealed that CIOs tend to concentrate on the operational (or supply) side roles during the early stages of the OLC, whereas strategic (or demand) side roles are predominant in the late stages and the decline stage of the OLC. Taken together, these findings suggest that the configuration of the CIO roles differ across the five stages of the OLC.

This research has made several important contributions to knowledge, theory and practice. Firstly, it provides a promising building block for the academic body of knowledge in terms of the comprehensive review of the literature, methodology used, statistical analysis conducted and the results obtained. Secondly, the integrated contingencies (five OLC stages) investigated in this study have contributed to our understanding of the CIO role and also clarified a vital role (the CIO) that was previously described in the literature as ambiguous. Furthermore, the integrated OLC-CIO role framework developed in this study provides a roadmap for the CIOs to play the most appropriate configuration of roles (supply) according to the current OLC stage of their firms (demand). Moreover, the OLC-CIO role framework proposed in this study can be a very useful tool for top management and for providers of education and/or professional development of CIOs to ensure more effective recruiting, retention, and training programs.



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# APPENDICES

## Appendix A: Research Questionnaire

### A national survey of Australian CIOs:

### Identifying the configuration of Chief information Officer Roles across the stages of the Organisational Life Cycle

Moyassar AL-Taie

University of Southern Queensland



**The Researcher**

**Moyassar AL-Taie**

School of Information Systems

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Ethics Officer

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## Appendices

**1. The following are general expectations that apply to the CIO role in varying degrees in organisations. Please indicate how important each expectation is in your organisation. (Tick one box only for each question)**

	<i>Not at all Important</i>						<i>Critically important</i>
	1	2	3	4	5	6	7
(a) Keep key systems operational.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Establish and maintain an IT department that is responsive to user requests/problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) Establish electronic linkages throughout the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) Ensure the organisation's users have adequate workstations (PCs/Laptops/Tablets) to accomplish their jobs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Establish electronic linkages to external entities (customers, suppliers, partners, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Direct efforts to build an integrated delivery system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) Build and maintain an IT staff with skill sets that match your current and planned technology base.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(h) Champion digital literacy throughout the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(i) Provide insight to the top management team/executive staff (TMT) on new emerging technologies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(j) Assist top management team/executive staff (TMT) in improving their digital literacy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(k) Migrate organisation from legacy, departmental applications to cross-departmental, integrated applications.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(l) Develop/acquire an electronic document management capability throughout the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(m) Develop an understanding of the industry delivery process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(n) Provide executive oversight for all IT contracts with external vendors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(o) Negotiate with vendor IT organisations on new external contract proposals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(p) Ensure IT contracts with external vendors remain within scope and budget.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(q) Develop and implement a strategic IT plan that aligns with the organisation's strategic business plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(r) Develop/maintain metrics that measure the value of IT to the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(s) Direct IT-enabled business process restructuring/reengineering.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(t) Provide expertise on multidisciplinary business process improvement teams.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(u) Interact often with non-IT managers throughout the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(v) Be intimately involved in shaping the mission/vision of the organisation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(w) Be intimately involved in business strategic planning and decisions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(x) Provide oversight for quality assurance of organisational data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(y) Ensure confidentiality and security of organisational data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**2. The organisational life cycle (OLC) is a model proposes that over time organisations move through a fairly predictable sequence of developmental stages. To help us identify your**

**organisation's current stage of the organisational life cycle, please indicate your degree of agreement with each of the following statements in relation to your organisation for the last financial year.**

	<i>Strongly disagree</i>					<i>Neither agree nor disagree</i>				<i>Strongly agree</i>
	1	2	3	4	5	6	7			
(a) Our organisation is small, both in size and relative to our competitors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(b) As an organisation, we are larger than most of our competitors, but not as large as we could be.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(c) We are a widely dispersed organisation, with a board of directors and shareholders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(d) The decision making authority in our organisation is primarily in the hands of the founder/owner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(e) Power in our organisation is spread among a group of several owners/investors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(f) Power in our organisation is concentrated in our vast number of shareholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(g) Our organisational structure could best be described as simple.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(h) Our organisation's structure is department-based and functional, and becoming much more formal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(i) Structure in our organisation is divisional or matrix in nature, with highly sophisticated control systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(j) Our organisation's structure is centralized with few control systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(k) In our organisation, we have some specialization (e.g. accountants and possibly engineers) and we are becoming somewhat differentiated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(l) Information processing in our organisation could best be described as simple.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(m) Information processing in our organisation is best described as monitoring performance and facilitating communication between departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(n) Information processing is sophisticated and necessary for efficient production and earning adequate profits.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(o) Information processing in our organisation is very complex, used for coordination of diverse activities to better serve markets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(p) Information processing is not very sophisticated, but badly needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(q) Decision-making is centralized at the top of the organisation and considered to be not very complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(r) Most decisions in our organisation are made by a group of managers who utilize systematic analysis, but are still fairly bold (risk takers).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(s) Most decisions in our organisation are made by managers, task forces, and project teams who are trying to facilitate growth through participation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
(t) Most decisions in our organisation are made by a few managers who take a conservative and internally political approach to decision making.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

**3. Which statement best describes the present vision of your top management team/executive staff of the role of information technology (IT) in your organisation? (Tick one box only)**

## Appendices

a) <b>The potential of IT is cost saving or quality improvement through automation</b> — that is, the role of IT is to replace expensive, unreliable human labour, or at least transform its productivity.	<input type="checkbox"/> <sub>1</sub>
b) <b>The potential of IT is to empower employee driven performance improvement</b> — that is, the role of IT is to provide data and transactions that yield a far fuller picture at ‘operator’ level, with members of the staff gaining greater insight into their own activities.	<input type="checkbox"/> <sub>2</sub>
c) <b>The potential of IT is to transform the organisation</b> — that is, the role of IT is to fundamentally change the organisation and/or industry through new products or services often including redefinition of relationships with our customers and/or suppliers.	<input type="checkbox"/> <sub>3</sub>
d) <b>The potential of IT is increased managerial control of the organisation</b> — that is, the role of IT is to provide data and transactions that allow management more clear and organized views of the state and dynamics of the organisation.	<input type="checkbox"/> <sub>4</sub>

### 4. Please indicate your degree of agreement with each of the following statements in relation to your organisation.

	<i>Strongly disagree</i>				<i>Strongly agree</i>		
	1	2	3	4	5	6	7
a) Information is used to a great extent in our production or service operations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Information used in our production or service operations is frequently updated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Information used in our production or service operations is usually accurate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Many steps in our production or service operations require the frequent use of information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 5. CIO Reporting Structure: To whom do you primarily report?

- <sub>1</sub> Chief Executive Officer (CEO)
- <sub>2</sub> Chief Financial Officer (CFO)
- <sub>3</sub> Chief Operating Officer (COO)
- <sub>4</sub> Other—*please specify* \_\_\_\_\_

## CIO Demographic Information

Please answer the following questions regarding yourself, your job and your organisation.

### 6. What is your age group? (Tick one box only)

- <sub>1</sub> Less than 30 yrs
- <sub>2</sub> 31 to 40 yrs
- <sub>3</sub> 41 to 50 yrs
- <sub>4</sub> 51 to 60 yrs
- <sub>5</sub> 60 yrs and over

**7. What is your gender?** (Tick one box only)

- <sub>1</sub> Male
- <sub>2</sub> Female

**8. What is your highest level of education?** (Tick one box only)

- <sub>1</sub> Secondary school
- <sub>2</sub> Undergraduate degree
- <sub>3</sub> Masters
- <sub>4</sub> PhD/Doctorate

**9. Job title: which of the following categories best describes your current job title?**

- <sub>1</sub> IT/IS Manager
- <sub>2</sub> IT/IS Director
- <sub>3</sub> MIS Manager
- <sub>4</sub> EDP Manager
- <sub>5</sub> CIO
- <sub>6</sub> CTO
- <sub>7</sub> Vice President IT
- <sub>8</sub> Other (please specify)\_\_\_\_\_

**10. How many years have you been in the IT profession?**

- <sub>1</sub> Less than 5 years
- <sub>2</sub> 6 to 10 years
- <sub>3</sub> 11 to 15 years
- <sub>4</sub> 16 to 20 years
- <sub>5</sub> More than 20 years

**11. How many years have you been in your current position?**

- <sub>1</sub> Less than 1 year
- <sub>6</sub> 1 to 5 years
- <sub>3</sub> 6 to 10 years
- <sub>4</sub> More than 10 years

**12. What is your organisation's primary industry?**

- <sub>1</sub> Accommodation, cafes & restaurants
- <sub>2</sub> Agriculture, forestry & fishing
- <sub>3</sub> Communication services
- <sub>4</sub> Construction
- <sub>5</sub> Cultural & recreational services
- <sub>6</sub> Education
- <sub>7</sub> Electricity, gas and water supply
- <sub>8</sub> Finance & insurance
- <sub>9</sub> Government administration & defence
- <sub>10</sub> Health & community services
- <sub>11</sub> Manufacturing
- <sub>12</sub> Mining
- <sub>13</sub> Personal and other services
- <sub>14</sub> Property and business services
- <sub>15</sub> Retail trade
- <sub>16</sub> Transport & storage
- <sub>17</sub> Wholesale trade
- <sub>18</sub> Other—*please specify*

**13. Where is the geographic location of head office of your organisation?**

- <sub>1</sub> NSW
- <sub>2</sub> WA
- <sub>3</sub> VIC
- <sub>4</sub> Tas.
- <sub>5</sub> Qld
- <sub>6</sub> ACT
- <sub>7</sub> SA
- <sub>8</sub> NT

**14. How many employees are in your organisation?**

- <sub>1</sub> Less than 50 employees
- <sub>2</sub> 50- 250 employees
- <sub>3</sub> Over 250 employees

Appendices

15. In what year your company was founded: \_\_\_\_\_

If *Yes*, please provide your full name including job title below and/or enclose your business card.

16. Do you wish to receive a summary report of the main findings from this study when they become available?

- <sub>1</sub> Yes  
<sub>2</sub> No

Please include your email and/or postal address

***Thank you very much for completing this questionnaire***

If you have any comment regarding this questionnaire or the research project, you may write them in the space provided on the next page. Please enclose the completed questionnaire in the reply -paid envelope provided and mail it back.

***Your opinion is highly appreciated.***

Should the reply-paid envelope provided have been mislaid, please forward your completed questionnaire to the reply-paid address below.

**Any additional comments about this survey and this research project may be made here:**


***Reply Paid***  
**Moyasser AL-Taie**  
**Faculty of Business and Law**  
**School of Information Systems**  
**University of Southern Queensland**  
**TOOWOOMBA QLD 4350**  
**Phone: (07) 4687 5769**  
**Mobile: 0401253582**  
**Email: moyasser.alyas@usq.edu.au**

*A copy of the report compiled from this survey will be sent to participating organisations upon request.*





## University of Southern Queensland

Faculty of Business and Law  
 School of Information Systems  
 Toowoomba, Queensland, 4350  
 AUSTRALIA  
<http://www.usq.edu.au>

Dear [REDACTED]

I am conducting a research project sponsored by the University of Southern Queensland on identifying the configuration of Chief Information Officer roles across the stages of the Organizational Life Cycle. The changing nature of the CIO role has generated considerable interest in the business and academic community. We would like to gain a better understanding of how the configuration of CIO roles varies across the different stages of the organisational life cycle as this will provide guidance as to what is most appropriate configuration of CIO roles for specific organisations. This will help you to determine the most appropriate configuration of CIO roles for your position that best fits with the IT demand of your organisation.

As the most senior IT executive/CIO in your organisation, we ask for your help in conducting this research project by completing the accompanying survey questionnaire.

We would be grateful if you could complete this short survey questionnaire which will take around 15-20 minutes to fill in.

You may be assured of complete anonymity. Your postal address, email address or phone number will only be used to contact you about this research project and its results if you are interested. At no time will it be used for any other purpose. The results of this project will be published in aggregate form, so you will never be personally identified as part of the results of this study.

This research project has ethical clearance approval (H11REA16) from University of Southern Queensland.

I would like to thank you in advance for participating in this study, and I would be happy to answer any questions you may have via email phone or postal mail.

Yours Sincerely,

*Moyassar AL-Taie*

Moyassar Al-Taie  
 Project Director

Email: [Moyassar.Alyas@usq.edu.au](mailto:Moyassar.Alyas@usq.edu.au)  
 Phone: +61 07 4687 5769  
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University of Southern Queensland

Faculty of Business and Law  
School of Information Systems  
Toowoomba, Queensland, 4350  
AUSTRALIA  
<http://www.usq.edu.au>

19<sup>th</sup> March 2012

Dear \_\_\_\_\_

Three weeks ago a questionnaire was sent to you as the most senior IT Executive/CIO in your organisation seeking your views of the configuration of CIO roles across the different stages of the organisational life cycle.

You may have already received, completed and returned this questionnaire on the Configuration of Chief Information Officer (CIO) roles across the stages of the organisational life cycle. If so, please disregard this letter. Your co-operation is very much appreciated.

However, if you have not yet had a chance to complete the questionnaire it is sincerely hoped that you could allocate some of your valuable time to respond to the survey. As the questionnaire was sent to a representative sample, it is most important that your views are included in the study if we are to represent people's views adequately. Although this survey is voluntary, your participation will help to ensure a successful and useful outcome to this research.

This questionnaire should be answered by you, or the person who is currently in charge of the IT functions of your organisation. Very little time is required to complete the questionnaire as most of the questions can be answered simply by ticking the appropriate box. Your responses will remain **strictly anonymous**.

It would be greatly appreciated if you could complete the attached questionnaire and send it back to me at the University. A reply-paid envelope is enclosed herewith for your convenience. A summary of the key findings of the study will be sent to you if you request a copy. If you have any queries please do not hesitate to contact me through email.

You may be assured of complete anonymity. Your postal address, email address or phone number will only be used to contact you about this research project and its results if you are interested. At no time will it be used for any other purpose. The results of this project will be published in aggregate form, so you will never be personally identified as part of the results of this study.

This research project has ethical clearance approval (H11REA16) from University of Southern Queensland.

I would like to thank you in advance for participating in this study, and I would be happy to answer any questions you may have via email phone or postal mail.

Yours Sincerely,

*Moyassar AL-Taie*  
Moyassar Al-Taie  
Project Director  
Email: [Moyassar.Alyas@usq.edu.au](mailto:Moyassar.Alyas@usq.edu.au)  
Phone: +61 07 4687 5769  
Mobile: +61 0401253582

## Appendix B: Ethical Approval

TOOWOOMBA QUEENSLAND 4350  
 AUSTRALIA  
 TELEPHONE +61 7 4631 2300

CRICOS: QLD 00244B NSW 02225M

[www.usq.edu.au](http://www.usq.edu.au)

**OFFICE OF RESEARCH AND HIGHER DEGREES**  
 Helen Phillips  
 Ethics Officer  
 PHONE (07) 4631 2690 | FAX (07) 4631 1995  
 EMAIL [ethics@usq.edu.au](mailto:ethics@usq.edu.au)

Thursday, 4 August 2011

Moyassar Zuhair AL-Taie  
 Faculty of Business  
 School of Information Systems  
 USQ Toowoomba Campus 4350

Dear Mr Al-Taie,

The Chair of the USQ Fast Track Human Research Ethics Committee (FTHREC) recently reviewed your responses to the FTHREC's conditions placed upon the ethical approval for the below project. Your proposal now meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethics approval has been granted.

Project Title	The impact of the different stages of organizational life cycle on the role of the chief information officer"
Approval no.	H11REA116
Start Date	01/08/2011
Expiry date	01/08/2012
FTHREC Decision	<b>Approved</b>

The standard conditions of this approval are:

- (a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
- (b) advise (email: [ethics@usq.edu.au](mailto:ethics@usq.edu.au)) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
- (c) make submission for approval of amendments to the approved project before implementing such changes
- (d) provide a 'progress report' for every year of approval
- (e) provide a 'final report' when the project is complete
- (f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website: <http://www.usq.edu.au/research/ethicsbio/human>

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

**Helen Phillips**  
 Ethics Officer  
 Office of Research and Higher Degrees

**Appendix C: Non-response Bias Test**

**Table C1 Mann-Whitney U Test for non-response bias**

Items	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	z-score	Asymp. Sig. (2-tailed)
Set1	Early	21	17.26	362.50	131.50	362.50	-0.19	0.84
	Late	13	17.88	232.50				
Set2	Early	21	17.19	361.00	130.00	361.00	-0.24	0.81
	Late	13	18.00	234.00				
Set3	Early	21	18.07	379.50	124.50	215.50	-0.45	0.65
	Late	13	16.58	215.50				
Set4	Early	21	17.69	371.50	132.50	223.50	-0.14	0.88
	Late	13	17.19	223.50				
Set5	Early	21	15.64	328.50	97.50	328.50	-1.43	0.15
	Late	13	20.50	266.50				
Set6	Early	21	16.05	337.00	106.00	337.00	-1.12	0.26
	Late	13	19.85	258.00				
Integ1	Early	21	18.31	384.50	119.50	210.50	-0.62	0.53
	Late	13	16.19	210.50				
Integ2	Early	21	19.50	409.50	94.50	185.50	-1.54	0.12
	Late	13	14.27	185.50				
Integ3	Early	21	18.40	366.50	117.50	208.50	-0.69	0.48
	Late	13	16.04	208.50				
Integ4	Early	21	16.90	355.00	124.00	355.00	-0.46	0.64
	Late	13	18.46	240.00				
ReAr1	Early	<b>21</b>	<b>20.38</b>	<b>428.00</b>	<b>76.00</b>	<b>167.00</b>	<b>-2.26</b>	<b>0.02*</b>
	Late	<b>13</b>	<b>12.85</b>	<b>167.00</b>				
ReAr2	Early	21	19.71	414.00	90.00	181.00	-1.73	0.08
	Late	13	13.92	181.00				
ReAr3	Early	21	19.60	411.50	93.50	183.50	-1.63	0.10
	Late	13	14.12	163.50				
Edu1	Early	21	15.74	330.50	99.50	330.50	-1.36	0.17
	Late	13	20.35	264.50				
Edu2	Early	21	16.10	338.00	107.00	338.00	-1.08	0.27
	Late	13	19.77	257.00				
Edu3	Early	21	15.07	316.50	85.50	316.50	-1.88	0.06
	Late	13	21.42	278.50				
UtPr1	Early	21	18.79	394.50	109.5	200.50	-1.00	0.31
	Late	13	15.42	200.50				
UtPr2	Early	21	18.55	389.50	114.50	205.50	-0.81	0.41
	Late	13	15.81	205.50				
UtPr3	Early	21	18.38	386.00	118.00	209.00	-0.67	0.49
	Late	13	16.08	209.00				
UtPr4	Early	21	19.21	403.50	100.50	191.50	-1.30	0.19
	Late	13	14.73	191.50				
InfSt2	Early	21	17.57	369.00	135.00	226.00	-0.05	0.95
	Late	13	17.38	226.00				
InfSt3	Early	21	16.17	339.50	108.50	339.50	-1.02	0.30
	Late	13	19.65	255.50				
InfSt4	Early	21	17.36	364.50	133.50	364.50	-0.11	0.90
	Late	13	17.73	230.50				
Exis1	Early	21	17.81	374.00	130.00	221.00	-0.23	0.81
	Late	13	17.00	221.00				

Table C1 Mann-Whitney U Test for non-response bias (continued)

Items	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	z-score	Asymp. Sig. (2-tailed)
Exis2	Early	21	17.07	358.50	127.50	358.50	-0.34	0.73
	Late	13	18.19	236.50				
Exis3	Early	21	18.98	398.50	105.50	196.50	-1.11	0.26
	Late	13	15.12	196.50				
Exis4	Early	21	16.31	342.50	111.50	342.50	-0.91	0.36
	Late	13	19.42	252.50				
Surv1	Early	21	15.64	328.50	97.50	328.50	-1.46	0.14
	Late	13	20.50	266.50				
Surv2	Early	21	16.57	348.00	117.00	348.00	-0.72	0.47
	Late	13	19.00	247.00				
Surv3	Early	21	16.55	347.50	116.50	347.50	-0.72	0.47
	Late	13	19.04	247.50				
Surv4	Early	21	16.45	345.50	114.50	345.50	-0.79	0.42
	Late	13	19.19	249.50				
Succ1	Early	21	19.17	402.50	101.50	192.50	-1.29	0.19
	Late	13	14.81	192.50				
Succ2	Early	21	15.00	315.00	84.00	315.00	-1.96	0.05*
	Late	13	21.54	280.00				
Succ3	Early	21	19.55	410.50	93.500	184.500	-1.57	0.11
	Late	13	14.19	184.50				
Succ4	Early	21	17.86	375.00	129.00	220.00	-0.27	0.78
	Late	13	16.92	220.00				
Rene1	Early	21	16.71	351.00	120.00	351.00	-0.59	0.54
	Late	13	18.77	244.00				
Rene2	Early	21	17.26	362.50	131.50	362.50	-0.18	0.85
	Late	13	17.88	232.50				
Rene3	Early	21	18.21	382.50	121.50	212.50	-0.54	0.58
	Late	13	16.35	212.50				
Rene4	Early	21	18.17	381.50	122.50	213.50	-0.50	0.61
	Late	13	16.42	213.50				
Dic11	Early	21	18.14	381.00	123.00	214.00	-0.48	0.62
	Late	13	16.46	214.00				
Dic12	Early	21	17.24	362.00	131.00	262.00	-0.20	0.83
	Late	13	17.92	233.00				
Dic13	Early	21	17.60	369.50	134.50	225.50	-0.07	0.94
	Late	13	17.35	225.50				
Dic14	Early	21	18.26	383.50	120.50	211.50	-0.57	0.56
	Late	13	16.27	211.50				
S.IT.V	Early	21	15.36	322.50	91.50	322.50	-1.72	0.085
	Late	13	20.96	272.50				
Info.Int1	Early	21	18.88	396.50	107.50	198.50	-1.08	0.27
	Late	13	15.27	198.50				
Info.Int2	Early	21	19.90	418.00	86.00	177.00	-1.88	0.06
	Late	13	13.62	177.00				
Info.Int3	Early	21	18.19	382.00	122.00	213.00	-0.55	0.58
	Late	13	16.38	213.00				
Info.Int4	Early	21	17.33	364.00	133.00	364.00	-0.13	0.89
	Late	13	17.77	231.00				

\* Sig.  $P < 0.05$

**Appendix D: Moderation Effect Results for Information Intensity**

**Table D1 The CIO Roles in Existence Stage Moderated by Information Intensity (N= 36)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2^*$	Conclusion
Existence → Strategist	0.442**	0.330 ns	0.19	0.19	0.00	Nil
Information Intensity → Strategist	0.14 ns	0.10 ns				
Interaction Terms → Strategist	-----	0.26 ns				
Existence → Relationship Architect	0.04 ns	0.07 ns	0.12	0.12	0.00	Nil
Information Intensity → Relationship Architect	0.35 ns	0.32 ns				
Interaction Terms → Relationship Architect	-----	0.22 ns				
Existence → Integrator	0.15 ns	0.08 ns	0.09	0.16	0.08	Small-medium
Information Intensity → Integrator	0.30 ns	0.11 ns				
Interaction Terms → Integrator	-----	0.37 ns				
Existence → Educator	0.07 ns	0.10 ns	0.10	0.29	0.21	Medium-large
Information Intensity → Educator	0.29 ns	0.38 **				
Interaction Terms → Educator	-----	0.43**				
Existence → Information Steward	0.34 **	0.34 **	0.22	0.31	0.12	Small-medium
Information Intensity → Information Steward	0.25 ns	0.20 ns				
Interaction Terms → Information Steward	-----	0.29 ns				
Existence → Utility Provider	0.32 ns	0.31 ns	0.17	0.24	0.08	Small-medium
Information Intensity → Utility Provider	0.19 ns	0.16 ns				
Interaction Terms → Utility Provider	-----	0.25 ns				

\* $f^2 = R^2_{Included} - R^2_{Excluded} / 1 - R^2_{Excluded}$  \*\*Significant at  $p < 0.05$  ns = Not Significant

**Table D2 The CIO Roles in Survival Stage Moderated by Information Intensity (N= 29)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$ **	Conclusion
Survival→ Strategist	0.30 ns	0.28 ns	0.18	0.20	0.02	small
Information Intensity → Strategist	0.19 ns	0.03 ns				
Interaction Terms → Strategist	-----	0.23 ns				
Survival→ Relationship Architect	0.37 ns	0.34 ns	0.11	0.18	0.08	Small-medium
Information Intensity → Relationship Architect	0.09 ns	0.29 ns				
Interaction Terms → Relationship Architect	-----	0.32 ns				
Survival→ Integrator	0.20 ns	0.16 ns	0.21	0.25	0.05	Small
Information Intensity → Integrator	0.34 ns	0.19 ns				
Interaction Terms → Integrator	-----	0.25 ns				
Survival→ Educator	0.28 ns	0.29 ns	0.21	0.22	0.01	Small
Information Intensity → Educator	0.26 ns	0.33 ns				
Interaction Terms → Educator	-----	0.12 ns				
Survival→ Information Steward	0.52 ***	0.49 **	0.32	0.38	0.09	Small-medium
Information Intensity → Information Steward	0.08 ns	0.11ns				
Interaction Terms → Information Steward	-----	0.31 ns				
Survival→ Utility Provider	0.01 ns	0.00 ns	0.49	0.49	0.00	Nil
Information Intensity → Utility Provider	0.70 ****	0.71 **				
Interaction Terms → Utility Provider	-----	0.02 ns				

\*  $f^2 = \frac{R^2_{Included}(\text{interaction effect}) - R^2_{Excluded}(\text{main effect})}{1 - R^2_{Excluded}(\text{main effect})}$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\* Significant at  $p < 0.001$  ns = Not Significant

Appendices

**Table D3 The CIO Roles in Success Stage Moderated by Information Intensity (N=44)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$ *	Conclusion
Success → Strategist	0.32***	0.29 **	0.21	0.25	0.05	small
Information Intensity → Strategist	0.24 ns	0.23 ns				
Interaction Terms → Strategist	-----	0.21 ns				
Success → Relationship Architect	0.37 ***	0.35 **	0.15	0.15	0.00	Nil
Information Intensity → Relationship Architect	0.04 ns	0.04 ns				
Interaction Terms → Relationship Architect	-----	0.07 ns				
Success → Integrator	0.44***	0.38 ***	0.22	0.31	0.12	Small-medium
Information Intensity → Integrator	0.08 ns	0.06 ns				
Interaction Terms → Integrator	-----	0.32 ns				
Success → Educator	0.04 ns	0.01 ns	0.17	0.25	0.10	Small-medium
Information Intensity → Educator	0.40***	0.37 ***				
Interaction Terms → Educator	-----	0.29 ns				
Success → Information Steward	0.09 ns	0.11 ns	0.08	0.08	0.00	Nil
Information Intensity → Information Steward	0.23 ns	0.23 ns				
Interaction Terms → Information Steward	-----	0.07 ns				
Success → Utility Provider	0.27 ns	0.27 ns	0.07	0.09	0.02	Small
Information Intensity → Utility Provider	0.00 ns	0.03 ns				
Interaction Terms → Utility Provider	-----	0.14 ns				

\*  $f^2 = \frac{R^2_{Included} (interaction\ effect) - R^2_{Excluded} (main\ effect)}{1 - R^2_{Excluded} (main\ effect)}$  \*\*Significant at  $p < 0.05$  \*\*\* Significant at  $p < 0.01$  ns = Not Significant



**Table D4 The CIO Roles in Renewal Stage Moderated by Information Intensity (N=44)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$ *	Conclusion
Renewal → Strategist	0.24 ns	0.32 ns	0.10	0.20	0.11	Medium
Information Intensity → Strategist	0.13 ns	0.03 ns				
Interaction Terms → Strategist	-----	0.37 ns				
Renewal → Relationship Architect	0.39 **	0.43 **	0.17	0.19	0.02	Small
Information Intensity → Relationship Architect	0.04 ns	0.00 ns				
Interaction Terms → Relationship Architect	-----	0.15 ns				
Renewal → Integrator	0.38 ns	0.51 *	0.17	0.35	0.22	Medium- large
Information Intensity → Integrator	0.07 ns	0.20 ns				
Interaction Terms → Integrator	-----	0.48 *				
Renewal → Educator	0.39*****	0.35 **	0.15	0.20	0.06	Small-medium
Information Intensity → Educator	0.16 ns	0.15 ns				
Interaction Terms → Educator	-----	0.49 ns				
Renewal → Information Steward	0.43**	0.47 **	0.20	0.23	0.04	Small
Information Intensity → Information Steward	0.03 ns	0.02 ns				
Interaction Terms → Information Steward	-----	0.19 ns				
Renewal → Utility Provider	0.04 ns	0.07 ns	0.19	0.21	0.04	Small
Information Intensity → Utility Provider	0.42*****	0.38 ***				
Interaction Terms → Utility Provider	-----	0.09 ns				

\*  $f^2 = \frac{R^2_{Included} (interaction\ effect) - R^2_{Excluded} (main\ effect)}{1 - R^2_{Excluded} (main\ effect)}$  \*\*Significant at  $p < 0.05$  \*\*\*Significant at  $p < 0.01$  \*\*\*\* Significant at  $p < 0.005$  \*\*\*\*\* Significant at  $p < 0.001$  \*\*\*\*\* Significant at  $p < 0.0005$  ns = Not Significant

Appendices

**Table D5 The CIO Role in Decline Stage Moderated by Information Intensity (N=21)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$	Conclusion
Decline → Strategist	0.57 **	0.55 *	0.44	0.46	0.04	Small
Information Intensity → Strategist	0.30 ns	0.29 ns				
Interaction Terms → Strategist	-----	0.10 ns				
Decline → Relationship Architect	0.15 ns	0.08 ns	0.13	0.27	0.16	Medium
Information Intensity → Relationship Architect	0.34 ns	0.29 ns				
Interaction Terms → Relationship Architect	-----	0.44 ns				
Decline → Integrator	0.62 ****	0.64 ns	0.60	0.61	0.03	Small
Information Intensity → Integrator	0.45 ***	0.44 *				
Interaction Terms → Integrator	-----	0.06 ns				
Decline → Educator	0.26 ns	0.26 ns	0.10	0.10	0.00	Nil
Information Intensity → Educator	0.16 ns	0.16 ns				
Interaction Terms → Educator	-----	0.10 ns				
Decline → Information Steward	0.25 ns	0.22 ns	0.17	0.17	0.00	Nil
Information Intensity → Information Steward	0.31 ns	0.31 ns				
Interaction Terms → Information Steward	-----	0.08 ns				
Decline → Utility Provider	0.30 ns	0.15 ns	0.10	0.27	0.19	Medium
Information Intensity → Utility Provider	0.10 ns	0.12 ns				
Interaction Terms → Utility Provider	-----	0.44 n.s				

\*  $f^2 = R^2_{Included} (interaction\ effect) - R^2_{Excluded} (main\ effect) / 1 - R^2_{Excluded} (main\ effect)$  \*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\*

Significant at  $p < 0.001$  ns = Not Significant

**Appendix E: Moderation Effect Results for Strategic IT Vision**

**Table E1 CIO Roles in Existence Stage Moderated by Strategic IT Vision (N= 36)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$	Conclusion
Existence → Strategist	0.19 ns	0.25 ns	0.23	0.31	0.10	Small-medium
Automate Vision → Strategist	0.43**	0.45**				
Informate Vision → Strategist	0.02 ns	0.04 ns				
Transform → Strategist	0.05 ns	0.07 ns				
Interaction Terms One (Existence * Automate) → Strategist	----	0.11 ns				
Interaction Terms Two (Existence * Informate) → Strategist	----	0.16 ns				
Interaction Terms Three (Existence * Transform) → Strategist	----	0.16 ns				
Existence → Relationship Architect	0.01 ns	0.06 ns	0.14	0.21	0.08	Small-medium
Automate Vision → Relationship Architect	0.42*	0.45**				
Informate Vision → Relationship Architect	0.06 ns	0.08 ns				
Transform Vision → Relationship Architect	0.08 ns	0.10 ns				
Interaction Terms One (Existence * Automate) → Relationship Architect	----	0.27 ns				
Interaction Terms Two (Existence * Informate) → Relationship Architect	----	0.05 ns				
Interaction Terms Three (Existence * Transform) → Relationship Architect	----	0.13 ns				
Existence → Integrator	0.06 ns	0.01 ns	0.21	0.27	0.08	Small-medium
Automate Vision → Integrator	0.34 ns	0.26 ns				
Informate Vision → Integrator	0.02 ns	0.01 ns				
Transform Vision → Integrator	0.47*	0.48**				
Interaction Terms One (Existence * Automate) → Integrator	----	0.13 ns				
Interaction Terms Two (Existence * Informate) → Integrator	----	0.11 ns				
Interaction Terms Three (Existence * Transform) → Integrator	----	0.12 ns				

**Table E1 CIO Roles in Existence Stage Moderated by Strategic IT Vision (N= 36)**

Path	$\beta$ Excluded	$\beta$ Included	R <sup>2</sup> Excluded	R <sup>2</sup> Included	f <sup>2</sup> *	Conclusion
Existence → Educator	0.24 ns	0.15 ns	0.15	0.19	0.05	Small-medium
Automate Vision → Educator	0.34*	0.37 ns				
Informate Vision → Educator	0.03 ns	0.01 ns				
Transform Vision → Educator	0.01 ns	0.01 ns				
Interaction Terms One (Existence * Automate) → Educator	----	0.07 ns				
Interaction Terms Two (Existence * Informate) → Educator	----	0.21 ns				
Interaction Terms Three (Existence * Transform) → Educator	----	0.07 ns				
Existence → Information Steward	0.43**	0.45 ns	0.33	0.46	0.17	Medium
Automate Vision → Information Steward	0.03 ns	0.13 ns				
Informate Vision → Information Steward	0.09 ns	0.10 ns				
Transform Vision → Information Steward	0.35 ns	0.30 ns				
Interaction Terms One (Existence * Automate) → Information Steward	----	0.05 ns				
Interaction Terms Two (Existence * Informate) → Information Steward	----	0.18 ns				
Interaction Terms Three (Existence * Transform) → Information Steward	----	0.16 ns				
Existence → Utility Provider	0.35 ns	0.36 ns	0.32	0.37	0.07	Medium
Automate Vision → Utility Provider	0.25 ns	0.26 ns				
Informate Vision → Utility Provider	0.08 ns	0.11 ns				
Transform Vision → Utility Provider	0.37 ns	0.39 *				
Interaction Terms One (Existence * Automate) → Utility Provider	----	0.08 ns				
Interaction Terms Two (Existence * Informate) → Utility Provider	----	0.24 ns				
Interaction Terms Three (Existence * Transform) → Utility Provider	----	0.36 ns				

\* $f^2 = \frac{R^2_{Included}(\text{interaction effect}) - R^2_{Excluded}(\text{main effect})}{1 - R^2_{Excluded}(\text{main effect})}$  \*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\* Significant at  $p$

$< 0.001$  \*\*\*\*\* Significant at  $p < 0.0005$  ns = Not Significant

**Table E2 CIO Roles in Survival Stage Moderated by Strategic IT Vision (N=29)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$	Conclusion
Survival → Strategist	0.44 ****	0.42 ns	0.39	0.42	0.05	Small-medium
Automate Vision → Strategist	0.00 ns	0.09 ns				
Informate Vision → Strategist	0.55 ****	0.57 ***				
Transform → Strategist	0.07 ns	0.13 ns				
Interaction Terms One ( Survival * Automate) → Strategist	----	0.18 ns				
Interaction Terms Two ( Survival * Informate) → Strategist	----	0.08 ns				
Interaction Terms Three ( Survival * Transform) → Strategist	----	0.13 ns				
Survival → Relationship Architect	0.33 ns	0.31 ns	0.14	0.15	0.01	Small
Automate Vision → Relationship Architect	0.15 ns	0.14 ns				
Informate Vision → Relationship Architect	0.15 ns	0.19 ns				
Transform Vision → Relationship Architect	0.06 ns	0.10 ns				
Interaction Terms One ( Survival * Automate) → Relationship Architect	----	0.00 ns				
Interaction Terms Two ( Survival * Informate) → Relationship Architect	----	0.02 ns				
Interaction Terms Three ( Survival * Transform) → Relationship Architect	----	0.15 ns				
Survival → Integrator	0.32 ns	0.30 ns	0.20	0.32	0.15	Medium
Automate Vision → Integrator	0.25 ns	0.00 ns				
Informate Vision → Integrator	0.06 ns	0.04 ns				
Transform Vision → Integrator	0.27 ns	0.11 ns				
Interaction Terms One ( Survival * Automate) → Integrator	----	0.42 ns				
Interaction Terms Two ( Survival * Informate) → Integrator	----	0.19 ns				
Interaction Terms Three ( Survival * Transform) → Integrator	----	0.27 ns				

**Table E2 CIO Roles in Survival Stage Moderated by Strategic IT Vision (N=29) (continued)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$	Conclusion
Survival → Educator	0.45 **	0.35 ns	0.30	0.46	0.23	Medium-large
Automate Vision → Educator	0.24 ns	0.04 ns				
Informate Vision → Educator	0.29 ns	0.23 ns				
Transform Vision → Educator	0.01 ns	0.05 ns				
Interaction Terms One ( Survival * Automate) → Educator	----	0.53 ns				
Interaction Terms Two ( Survival * Informate) → Educator	----	0.34 ns				
Interaction Terms Three ( Survival * Transform)→ Educator	----	0.06 ns				
Survival → Information Steward	0.65 ****	0.65 ns	0.50	0.56	0.12	Small-medium
Automate Vision → Information Steward	0.22 ns	0.16 ns				
Informate Vision → Information Steward	0.29 ns	0.08 ns				
Transform Vision → Information Steward	0.30 *	0.35 ns				
Interaction Terms One ( Survival * Automate) → Information Steward	----	0.08 ns				
Interaction Terms Two ( Survival * Informate) → Information Steward	----	0.13 ns				
Interaction Terms Three ( Survival * Transform)→ Information Steward	----	0.25 ns				
Survival → Utility Provider	0.36 ns	0.44 ns	0.28	0.46	0.25	Medium-large
Automate Vision → Utility Provider	0.10 ns	0.18 ns				
Informate Vision → Utility Provider	0.39 ns	0.18 ns				
Transform Vision → Utility Provider	0.11 ns	0.04 ns				
Interaction Terms One ( Survival * Automate) → Utility Provider	----	0.06 ns				
Interaction Terms Two ( Survival * Informate) → Utility Provider	----	0.35 ns				
Interaction Terms Three ( Survival * Transform)→ Utility Provider	----	0.29 ns				

\* $f^2 = \frac{R^2_{Included}(\text{interaction effect}) - R^2_{Excluded}(\text{main effect})}{1 - R^2_{Excluded}(\text{main effect})}$  \*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\* Significant at  $p < 0.001$  \*\*\*\*\* Significant at  $p < 0.0005$  ns = Not Significant

**Table E3 CIO Roles in Success Stage Moderating by Strategic IT Vision (N=44)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$ *	Conclusion
Success → Strategist	0.41 **	0.41 **	0.18	0.28	0.12	Small-medium
Automate Vision → Strategist	0.03 ns	0.02 ns				
Informate Vision → Strategist	0.16 ns	0.21 ns				
Transform → Strategist	0.06	0.05 ns				
Interaction Terms One ( Success * Automate) → Strategist	----	0.28 ns				
Interaction Terms Two ( Success * Informate) → Strategist	----	0.19 ns				
Interaction Terms Three ( Success * Transform) → Strategist	----	0.26 ns				
Success → Relationship Architect	0.38**	0.41 **	0.15	0.22	0.08	Small-medium
Automate Vision → Relationship Architect	0.08 ns	0.05 ns				
Informate Vision → Relationship Architect	0.07 ns	0.11 ns				
Transform Vision → Relationship Architect	0.12 ns	0.11 ns				
Interaction Terms One ( Success * Automate) → Relationship Architect	----	0.16 ns				
Interaction Terms Two ( Success * Informate) → Relationship Architect	----	0.13 ns				
Interaction Terms Three ( Success * Transform) → Relationship Architect	----	0.25 ns				
Success → Integrator	0.44 **	0.47 **	0.26	0.37	0.15	Medium
Automate Vision → Integrator	0.14 ns	0.19 ns				
Informate Vision → Integrator	0.14 ns	0.10 ns				
Transform Vision → Integrator	0.05 ns	0.03 ns				
Interaction Terms One ( Success * Automate) → Integrator	----	0.25 ns				
Interaction Terms Two ( Success * Informate) → Integrator	----	0.03 ns				
Interaction Terms Three (Success * Transform) → Integrator	----	0.27 ns				

**Table E3 CIO Roles in Success Stage Moderating by Strategic IT Vision (N=44) (continued)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$	Conclusion
Success → Educator	0.19 ns	0.22 ns	0.09	0.16	0.08	Small-medium
Automate Vision → Educator	0.07 ns	0.08 ns				
Informate Vision → Educator	0.22 ns	0.07 ns				
Transform Vision → Educator	0.05 ns	0.00 ns				
Interaction Terms One ( Success * Automate) → Educator	----	0.08 ns				
Interaction Terms Two ( Success * Informate) → Educator	----	0.24 ns				
Interaction Terms Three (Success * Transform)→ Educator	----	0.19 ns				
Success → Information Steward	0.18 ns	0.19 ns	0.05	0.11	0.06	Small-medium
Automate Vision → Information Steward	0.12 ns	0.14 ns				
Informate Vision → Information Steward	0.15 ns	0.01 ns				
Transform Vision → Information Steward	0.09 ns	0.08 ns				
Interaction Terms One ( Success * Automate) → Information Steward	----	0.00 ns				
Interaction Terms Two ( Success * Informate) → Information Steward	----	0.29 ns				
Interaction Terms Three (Success * Transform)→ Information Steward	----	0.03 ns				
Success → Utility Provider	0.20 ns	0.21 ns	0.19	0.20	0.01	Small
Automate Vision → Utility Provider	0.19 ns	0.17 ns				
Informate Vision → Utility Provider	0.10 ns	0.08 ns				
Transform Vision → Utility Provider	0.23 ns	0.22 ns				
Interaction Terms One ( Success * Automate) → Utility Provider	----	0.07 ns				
Interaction Terms Two ( Success * Informate) → Utility Provider	----	0.02 ns				
Interaction Terms Three ( Success * Transform)→ Utility Provider	----	0.07 ns				

\* $f^2 = \frac{R^2_{Included}(\text{interaction effect}) - R^2_{Excluded}(\text{main effect})}{1 - R^2_{Excluded}(\text{main effect})}$  \*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\* Significant at  $p < 0.001$  \*\*\*\*\* Significant at  $p < 0.0005$  ns = Not Significant



**Table E4 CIO Roles in Renewal Stage Moderated by Strategic IT Vision (N=44)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$	Conclusion
Renewal → Strategist	0.21 ns	0.26 ns	0.19	0.24	0.06	Small-medium
Automate Vision → Strategist	0.20 ns	0.30 ns				
Informate Vision → Strategist	0.30 ns	0.22 ns				
Transform → Strategist	0.57 ***	0.57 ns				
Interaction Terms One ( Renewal * Automate) → Strategist	----	0.04 ns				
Interaction Terms Two ( Renewal * Informate) → Strategist	----	0.09 ns				
Interaction Terms Three ( Renewal * Transform) → Strategist	----	0.32 ns				
Renewal → Relationship Architect	0.40 ***	0.53 *	0.18	0.45	0.33	Large
Automate Vision → Relationship Architect	0.11 ns	0.12 ns				
Informate Vision → Relationship Architect	0.00 ns	0.14 ns				
Transform Vision → Relationship Architect	0.15 ns	0.01 ns				
Interaction Terms One ( Renewal * Automate) → Relationship Architect	----	0.25 ns				
Interaction Terms Two ( Renewal * Informate) → Relationship Architect	----	0.42 ns				
Interaction Terms Three ( Renewal * Transform) → Relationship Architect	----	0.39 ns				
Renewal → Integrator	0.41 ns	0.35 ns	0.26	0.36	0.14	Medium
Automate Vision → Integrator	0.28 ns	0.18 ns				
Informate Vision → Integrator	0.14 ns	0.20 ns				
Transform Vision → Integrator	0.03 ns	0.21 ns				
Interaction Terms One ( Renewal * Automate) → Integrator	----	0.37 ns				
Interaction Terms Two ( Renewal * Informate) → Integrator	----	0.05 ns				
Interaction Terms Three ( Renewal * Transform) → Integrator	----	0.16 ns				

**Table E4 CIO Roles in Renewal Stage Moderated by Strategic IT Vision (N=44) (continued)**

Path	$\beta$ Excluded	$\beta$ Included	R <sup>2</sup> Excluded	R <sup>2</sup> Included	f <sup>2</sup> *	Conclusion
Renewal → Educator	0.28 *	0.48 *	0.25	0.35	0.13	Medium
Automate Vision → Educator	0.11 ns	0.25 ns				
Informate Vision → Educator	0.13 ns	0.00 ns				
Transform Vision → Educator	0.31 ***	0.68 ns				
Interaction Terms One ( Renewal * Automate) → Educator	----	0.36 ns				
Interaction Terms Two ( Renewal * Informate) → Educator	----	0.73 ns				
Interaction Terms Three ( Renewal * Transform)→ Educator	----	0.85 ns				
Renewal → Information Steward	0.46 ****	0.53 **	0.22	0.36	0.21	Medium-large
Automate Vision → Information Steward	0.09 ns	0.05 ns				
Informate Vision → Information Steward	0.18 ns	0.21 ns				
Transform Vision → Information Steward	0.07 ns	0.05 ns				
Interaction Terms One ( Renewal * Automate) → Information Steward	----	0.16 ns				
Interaction Terms Two ( Renewal * Informate) → Information Steward	----	0.20 ns				
Interaction Terms Three ( Renewal * Transform)→ Information Steward	----	0.33 ns				
Renewal → Utility Provider	0.21 ns	0.34 ns	0.11	0.25	0.16	Medium
Automate Vision → Utility Provider	0.32 ns	0.60 ns				
Informate Vision → Utility Provider	0.34 ns	0.30 ns				
Transform Vision → Utility Provider	0.45 **	0.69 ns				
Interaction Terms One ( Renewal * Automate) → Utility Provider	-----	0.07 ns				
Interaction Terms Two ( Renewal * Informate) → Utility Provider	----	0.41 ns				
Interaction Terms Three ( Renewal * Transform)→ Utility Provider	----	0.59 ns				

\* $f^2 = R^2_{Included} (interaction\ effect) - R^2_{Excluded} (main\ effect) / 1 - R^2_{Excluded} (main\ effect)$  \*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\* Significant at  $p < 0.001$  \*\*\*\*\* Significant at  $p < 0.0005$  ns = Not Significant

**Table E5 CIO Roles in Decline Stage Moderated by Strategic IT Vision (N=21)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$ *	Conclusion
Decline → Strategist	0.19 ns	0.27 ns	0.51	0.67	0.33	Large
Automate Vision → Strategist	0.15 ns	0.40 ns				
Informate Vision → Strategist	0.31 ns	0.17 ns				
Transform → Strategist	0.46 ns	0.27 ns				
Interaction Terms One ( Decline * Automate) → Strategist	----	0.47 ns				
Interaction Terms Two ( Decline * Informate) → Strategist	----	0.11 ns				
Interaction Terms Three ( Decline * Transform) → Strategist	----	0.54 ns				
Decline → Relationship Architect	0.09 ns	0.37 ns	0.37	0.51	0.19	Medium-large
Automate Vision → Relationship Architect	0.15 ns	0.06 ns				
Informate Vision → Relationship Architect	0.60 ns	0.19 ns				
Transform Vision → Relationship Architect	0.55 ns	0.24 ns				
Interaction Terms One ( Decline * Automate) → Relationship Architect	----	0.29 ns				
Interaction Terms Two ( Decline * Informate) → Relationship Architect	----	0.17 ns				
Interaction Terms Three ( Decline * Transform) → Relationship Architect	----	0.46 ns				
Decline → Integrator	0.43 **	0.41 ns	0.47	0.48	0.02	Small
Automate Vision → Integrator	0.19 ns	0.12 ns				
Informate Vision → Integrator	0.25 ns	0.45 ns				
Transform Vision → Integrator	0.02 ns	0.08 ns				
Interaction Terms One ( Decline * Automate) → Integrator	----	0.15 ns				
Interaction Terms Two ( Decline * Informate) → Integrator	----	0.25 ns				
Interaction Terms Three ( Decline * Transform) → Integrator	----	0.17 ns				

**Table E5 CIO Roles in Decline Stage Moderated by Strategic IT Vision (N=21) (continued)**

Path	$\beta$ Excluded	$\beta$ Included	$R^2$ Excluded	$R^2$ Included	$f^2$ *	Conclusion
Decline → Educator	0.04 ns	0.11 ns	0.34	0.58	0.36	Large
Automate Vision → Educator	0.17 ns	0.34 ns				
Informate Vision → Educator	0.57****	0.91 ns				
Transform Vision → Educator	0.10 ns	0.05 ns				
Interaction Terms One ( Decline * Automate) → Educator	----	0.08 ns				
Interaction Terms Two ( Decline * Informate) → Educator	----	0.51 ns				
Interaction Terms Three (Decline * Transform)→ Educator	----	0.56 ns				
Decline → Information Steward	0.20 ns	0.05 ns	0.47	0.56	0.17	Medium
Automate Vision → Information Steward	0.46 ns	0.37 ns				
Informate Vision → Information Steward	0.38 ns	0.10 ns				
Transform Vision → Information Steward	0.15 ns	0.19 ns				
Interaction Terms One ( Decline * Automate) → Information Steward	----	0.05 ns				
Interaction Terms Two ( Decline * Informate) → Information Steward	----	0.55 ns				
Interaction Terms Three ( Decline * Transform)→ Information Steward	----	0.31 ns				
Decline → Utility Provider	0.19 ns	0.30 ns	0.39	0.41	0.03	Small
Automate Vision → Utility Provider	0.37 ns	0.37 ns				
Informate Vision → Utility Provider	0.52 *	0.11 ns				
Transform Vision → Utility Provider	0.23 ns	0.05 ns				
Interaction Terms One ( Decline * Automate) → Utility Provider	----	0.01 ns				
Interaction Terms Two ( Decline * Informate) → Utility Provider	----	0.39 ns				
Interaction Terms Three ( Decline * Transform)→ Utility Provider	----	0.02 ns				

\*  $f^2 = \frac{R^2 \text{ Included (interaction effect)} - R^2 \text{ Excluded (main effect)}}{1 - R^2 \text{ Excluded (main effect)}}$  \*Significant at  $p < 0.05$  \*\*Significant at  $p < 0.01$  \*\*\* Significant at  $p < 0.005$  \*\*\*\* Significant at  $p < 0.001$  \*\*\*\*\* Significant at  $p < 0.0005$  ns = Not Significant

## Appendix F: Self-assessment to Identify Your Firm Life Cycle Stage

The following statements are designed to help managers to identify their organisations' stage of life cycle.

**Step 1:** Please read the following statements carefully and select an appropriate number for each of them from the alternative given here:

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agrees nor disagrees
- (4) Agree
- (5) Strongly Agree

**In my opinion, during the last financial year**

Statement	1 Strongly Disagree	2	3	4	5 Strongly Agree
(a) Our firm is small, both in size and relative to our competitors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) As a firm, we are larger than most of our competitors, but not as large as we could be.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) We are a widely dispersed firm, with a board of directors and shareholders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) The decision making authority in our firm is primarily in the hand of the founder/ owner.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Power in our firm is spread among a group of several owners/investors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Power in our firm is concentrated in our vast number of stakeholders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) Our firm's organisational structure could best be described as simple.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(h) Our firm's structure is department-based and functional, becoming much more formal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(i) Structure in our firm is divisional or matrix in nature, with highly sophisticated control systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(j) Our firm's structure is centralized with few control systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(k) In our firm, we have some specialization (e.g. accountants and possibly engineers) and we are becoming somewhat differentiated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(l) Information processing in our firm could best be described as simple.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(m) Information processing in our firm is best described as monitoring performance and facilitating communication between departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(n) Information processing in our firm is sophisticated and necessary for efficient production and earning adequate profits.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(o) Information processing in our firm is very complex, used for coordination of diverse activities to better serve markets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(p) Information processing in our firm is not very sophisticated, but badly needed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(q) Decision-making in our firm is centralized at the top of the firm and considered to be not very complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(r) Most decisions in our firm are made by a group of managers who utilize	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

systematic analysis, but are still fairly bold ( risk takers).					
(s)-Most decisions in our firm are made by managers, task forces, and project teams who are trying to facilitate growth through participation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(t) Most decisions in our firms are made by a few managers who take conservative and internally political approach to decision making.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Step 2:** In the column bellow, write the score you assigned to each statement next to the letter of that statement. Then write the sum of the scores at the bottom of each column. The column with the highest score will identify your firms' stage of growth.

<b>Existence stage score equals the sum of</b>	<b>Survival stage score equals the sum of</b>	<b>Success stage score equals the sum of</b>	<b>Renewal stage score equals the sum of</b>	<b>Decline stage score equals the sum of</b>
(a)	(e)	(b)	(c)	(j)
(d)	(k)	(f)	(i)	(p)
(g)	(m)	(h)	(o)	(q)
(l)	(r)	(n)	(s)	(t)
Total:	Total:	Total:	Total:	Total: