Impact of Entrepreneurial Orientation and Quality Management Practices on Product Innovation Performance: The Case of Hong Kong Electronics Manufacturing Firms in the Pearl River Delta Region, China.

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Declaration of Candidate

I hereby certify that the work in this thesis, submitted for fulfilling the requirements of the degree of Doctor of Business Administration (DBA) of the Macquarie Graduate School of Management (MGSM) at Macquarie University, is original and entirely the outcome of my contribution except as acknowledged by general and specific references.

I also certify that this thesis has never been submitted for a higher degree to any other university or institution. The research presented in this thesis was approved by the Faculty of Business and Economics, Human Research Ethics Committee (reference number: 5201001210(D)) on 25 October 2010.

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ABSTRACT

Product innovation performance (PIP) is recognized as a key strategic performance objective, and strategy or entrepreneurship literature suggests that firms with an entrepreneurial orientation (EO) tend to achieve high performance in their product innovation. Conversely, operations scholars advocate quality management practices (QMP) as a key determinant of product innovation performance. This view raises the question of how these two strategic views may, separately or jointly, influence the extent to which a firm achieves superior performance in product innovation. Furthermore, even though contextual factors affect how strategies contribute to the performance of a firm, few empirical assessments have been done to investigate factors such as presence of market unfairness, policy support or intensity of competition enhance or hinder mechanisms through which entrepreneurial orientation and quality management lead to product innovation performance.

To advance knowledge of product innovation performance, this thesis specifies and tests a structural model, forming the contingency view to examine relationships between these constructs. This study examines the direct associations between 1) EO and PIP and 2) QMP and PIP as well as three contingent factors (market unfairness, policy support, intensity of competition) that influence these associations. Using a structural equation modeling (SEM) technique, this study examines these direct and indirect relationships simultaneously to create a framework for the direct and indirect determinants of the firm's success in product innovation.

Investigations focus on Hong Kong electronics manufacturing firms operating in the Pearl River Delta (PRD) region of Guangdong Province in Southern China for two reasons. First, Hong Kong firms, which helped to build the PRD region into one of the global electronics outsourced manufacturing hubs, are declining due to a lack of

product innovation and competitiveness. Second, the region has undergone substantial transition since the Chinese Government launched an ambitious industrial upgrading programme in the 2000s and thus provides an opportunity to study how these complex contextual forces interact in this research model.

Data from a mail survey of 222 PRD region-based firms showed that, both entrepreneurial orientation (EO) and quality management practices (QMP) have a positive effect on the improvement of product innovation performance (PIP). However, there is a negative moderating effect of policy support and market unfairness on these relationships, i.e., when firms receive a high level of policy and political support in China, the stimulating effect of entrepreneurial orientation (EO) on PIP is weakened. Further, when firms perceive a high level of unfair practices in competition, the stimulating effect of QMP on PIP in these firms is weakened.

Primary contributions of this study are first, the proposed model offers a novel orchestration of constructs that sheds new light, from a contingency perspective, on the relationship between quality management, entrepreneurial orientation and product innovation. Second, the proposed solution is highly relevant and valuable for Hong Kong electronics firms, as it is built on best practices that work best in an entrepreneurial and continuous improvement context.

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List of Abbreviations

EO	= Entrepreneurial Orientation
HKEI	= Hong Kong Electronics Industry
ODM	= Original Design Manufacturer
OEM	= Original Equipment Manufacturer
PRD	= Pearl River Delta (Region)
R&D	= Research and Development
QM	= Quality Management
QMP	= Quality Management Practices
TQM	= Total Quality Management

CHAPTER ONE

INTRODUCTION

1.1 General Background

The Hong Kong electronic industry (HKEI) manufacturing has been a mainstay of the Hong Kong economy and contributed 58% of Hong Kong exports in 2012 (Chu, 2013b), and the industry is equally contributive to mainland China where its manufacturing activities are mainly based. It is estimated that 870,000 people are employed by the industry in the Southern China--Guangdong Pearl River Delta (PRD) region alone (Vocation Training Council, 2012) and Hong Kong electronic firms have been one of the earliest and largest foreign investors to China since the beginning of the 'Open Door Policy' in 1980 (Chu, 2013b). But despite its first mover advantage, the Hong Kong electronic industry (HKEI from thereafter) faces several critical challenges. These challenges are both exogenous and endogenous in nature.

First, Hong Kong firms have been reluctant to make a serious research and development (R & D) commitment and, as a result, Taiwanese and Korean competitors have overtaken HKEI in technology leadership and global brand recognition (Law and Gunasekaran, 2009 and 2012; Liao, 2013; Sharif and Huang, 2012; Yeung, 2007).

Second, since the emergence of China's own electronic manufacturing sector in the 1990s, Hong Kong firms in China no longer enjoy the earlier policy support from the regional and central governments (Sharif and Huang, 2012). Lastly, HKEI's over-reliance on contract manufacturing services for global brand-owners, forces many firms into a cost-driven defensive position (Chu, 2013a; Chu, 2013b; Law and

Gunasekaran, 2009 and 2012). This position deteriorates as appreciation of the Chinese currency (Renminbi ¥) pushes up both export price and production costs (Chu, 2013a).

In sum, intrinsic weaknesses and external changes demand a fundamental shift by HKEI in its business mindset---from a market-reactive one to a strategic and proactive one (Eng and Spickett-Jones, 2009; Liao, 2013; Sharif and Huang, 2012). The transition requires a broadening of these firms' competence from a contract manufacturing capability to competing on multiple imperatives, such as cost, quality reliability, flexibility, speed (Inman et. al., 2011; Kristal, Huang and Roth, 2010) and product innovation (Baker and Sinkula, 2002; Jimenez-Limenez and Sanz-Valle, 2011).

Many Hong Kong based firms, including electronic manufacturers, have implemented quality improvement practices (QMP) to various degrees (Chin, Tummala and Chan, 2002; Chiu, 1999; Ho, Duffy and Shih, 1999; Yeung, Cheng and Lai, 2005), and have achieved better operational performances as predicted by the theory of quality management (Chu, 2013b; Deming, 1986; Juran and Defoe, 2010; To, Lee and Yu, 2012; Yeung et al., 2005). QMP is a collection of techniques and practices, based on the tenets of quality management of customer focus, continuous improvement and a systematic approach to managing organizations (Juran and Defoe, 2010). Despite the wide adoption of QMP, HKEI is still generally weak at product innovation performance (PIP) in terms of the speed, scope and degree of newness in new product introduction (Chu, 2013b). This is a perplexing observation as there is evidence that QMPs also have a positive influence on a firm's PIP (Abrunhosa et al., 2008; Aravind, 2012; Kim, Kumar and Kumar, 2012, Ooi et al., 2012; Prajogo and

Sohal, 2004), and clarification of QMP's role with PIP will benefit Hong Kong electronics manufacturers in their decisions to capitalize on QMP, and their general competitiveness in the higher end spectrum of the global electronics market.

Even under these challenging circumstances, Hong Kong manufacturing firms are found to be idiosyncratically entrepreneurial in their Chinese style, which is characterized by being highly flexible, risk-taking, opportunity-seeking, future oriented and hard-working (Dubina and Ramos, 2013; Man and Lau, 2005; Sharif, Baark and Lau, 2012; Taormina and Lao, 2007). These attitudes are comparable to the western concept of entrepreneurial orientation (EO), a firm-level behavioural tendency measured by proactivity, innovativeness and willingness to take risks (Covin and Slevin, 1989; Lumpkin and Dess, 1996, Zhao et al., 2011). As shown by examples of successful technological businesses, firms with strong entrepreneurial orientation are reported to command superior innovation performance (Perez-Luno, Wiklund and Cabrera, 2011). This observation raises questions about whether Hong Kong electronic manufacturers can compete collectively and entrepreneurially in exploiting emerging opportunities in the changing Chinese environment, and hence able to improve their PIP and competitiveness. Given the substantial business potential of China under its current economic restructuring and industrial upgrading (Chen and Partridge, 2013), there are rewards for firms enjoying superior PIP (in terms of business competitiveness and market performance).

Besides firm-specific characteristics, external environmental factors also have impacts on a firm's innovation performance. This is especially relevant for Hong Kong electronics manufacturers operating in modern day Southern China, where there are different exogenous challenges. Due to its transitional nature, Chinese domestically-owned firms tend to adopt unfair practices such as piracy, industrial espionage and infringement of intellectual properties, and 'foreign' producers such as HKEI firms are often adversely affected. Institutional factors also play a significant role in interfering in market competition with a regional bias. For example, industrial support policies enforced by Pearl River Delta (PRD) authorities are critical to manufacturers' competitiveness though, arguably, these policy supports favour domestic manufacturers and marginalize Hong Kong manufacturers, especially during the current drive for industrial upgrading and economic restructuring. Lastly, Mainland Chinese electronic firms are tenaciously aggressive and extremely competitive, and this competitive intensity poses an additional external hostility to HKEI firms. With these multiple contextual complications, it is essential to answer questions such as whether these external forces are substantial enough to interfere with HKEI firms' PIP, and their relationships with internal driving factors for innovation performance.

This research aims to examine the effects of different predictors and contextual factors on the product innovation performance of HKEI firms. Specifically, product innovation performance of HKEI is chosen rather than other outcome variables for three reasons. First, it has been identified repeatedly by the Hong Kong Special Administrative Region (HKSAR) Government (HKSAR Govt. Trade and Industry Department 2010), the manufacturing sector (Hong Kong Baptist University, 2011) and academia (Liao and Chan, 2011; Sharif and Huang, 2012; Brandt and Thun, 2011) as one of the major challenges to Hong Kong's long-term economic and manufacturing competitiveness. The region's manufacturing firms lag behind counterparts in China, Singapore, South Korea, Japan, Malaysia and New Zealand in innovation outputs (Cornell University, INSEAD and WIPO, 2013). Second, Pearl River

Delta-based Hong Kong manufacturing firms have been marginalized by Mainland China innovation-driven industrial restructuring policy (Eng, 2009; Hong Kong Baptist University, 2011; Yang, 2012) and face severe competitive pressure in the short and mid-terms (Sharif and Huang, 2012; Yang, 2012). Hence industrial upgrading through improving innovation output has become imperative.

1.2 Theoretical justification of studying the predictors and moderating variables

The purpose of this study is to investigate whether product innovation performance (PIP) of Hong Kong electronic manufacturers based in the Pearl River Delta (PRD) region is positively and directly influenced by two proposed predictors, quality management practices (QMP) and entrepreneurial orientation (EO). Further, the effects of both QMP and EO on PIP are studied under the proposed moderating variables peculiar to the Chinese transitional environment, namely, market unfairness, policy support and competition intensity. The explanations for inclusion of these variables in the proposed model for studying HKEI firms' PIP follow.

One of the two predictors to be studied in this research is quality management practices (QMP), which can be conceptualized as a set of interdependent practices that follow the management of philosophy of quality management (Powell, 1995; Sitkin, Sutcliffe and Schroeder, 1994). QMP is selected as a predictor for two reasons:

1) It is widely implemented at present among HKEI firms in the Pearl River Delta region (Yeung et al., 2005);

2) There is a growing evidence that QMP is an antecedent to innovation performance (Abrunhosa et al., 2008; Aravind, 2012; Kim et al., 2012; Lopez-Mielgo, Montes-Peon and Vazquez-Ordas, 2009; Martinez-Costa and Martinez-Lorente, 2008;

Perdomo-Ortiz et.al. 2006) and particular to product innovation performance (PIP) (Feng et. al., 2006; Hung et,. al., 2011a; Kim et al., 2012; Ooi et. al., 2012; Prajogo and Hong, 2008).

As suggested by some researchers, firms implementing QMP are able to benefit from improved operational performance such as cost reduction and quality improvement, and also improve in PIP as a result of learning and insights gained from solving quality problems and better understanding of customers' expectations. Given the common adoption of QMP among Hong Kong electronic firms, an investigation of the suggested relationship between QMP and PIP thus becomes a justified and long-awaited research agenda for both adding knowledge to this less explored field and providing answers to HKEI's pressing challenges.

The other predictor to be examined is entrepreneurial orientation (EO), which measures a firm's behavioural and decision-making characteristics in the areas of risk-taking, innovativeness and pro-activeness (Covin and Slevin, 1989; Lumpkin and Dess, 1996; Miller, 1983). Some studies indicate that EO is another key variable leading to PIP (Atuahene-Gima, 2005; Boso, Cadogan and Story, 2013; Martinez-Roman and Romero, 2013; Perez-Luno et al., 2011) and recent findings from Chinese manufacturers support this viewpoint (e.g. Liu et al, 2014; Zhang and Duan, 2010). However, it is interesting to note that the literature is relatively silent on the role of EO in influencing PIP in manufacturing firms practising QMP (Al-Swidi and Mahmood, 2012) which is quite prevalent in most firms involved with the design and production of technological products (Wu and Zhang, 2013). Another interesting observation is that very little is known about the relationships of QMP and EO on PIP under various contextual variables, let alone under a Chinese transitional political and economic environment. HKEI firms are mostly made up of small and medium enterprises (SMEs) and many were established by Hong Kong Chinese entrepreneurs, so do these firms also manifest such entrepreneurial characteristics in their pursuit of technological and market opportunities? Also, are these HKEI firms entrepreneurial enough to overcome the aforementioned competitive and institutional challenges, while exploring and leveraging on their ambitions? Are the HKEI firms able to synergize their QMP insights and experience, their better Hong Kong-global connections and their entrepreneurial abilities to capitalize on emerging business opportunities, so as to deliver winning innovative products in the global market? All these questions are challenging and are answerable from the findings of this project.

Besides the two predictors, QMP and EO, and dependent variable PIP there are three additional moderating variables to be studied in this research model. The first moderating variable is market unfairness, which measures the extent of unfair practices perceived in this field of business in mainland China. This variable is included because it is widely reported that Chinese domestic competitors have not hesitated to use questionable means to take advantage of their competitors and the evolving legal or political frameworks. There are also reports that Hong Kong manufacturers in China have suffered interference from these market malpractices. Hong Kong business people are criticized for generally lacking the willingness to commit to innovation due to its uncertain payback and high likelihood of near-term financial losses. So are these malpractices in China an additional reason for hindering HKEI firms to improve their PIP? Also, is the perceived market unfairness so threatening to HKEI firms that it dissipates the positive effects of QMP and EO on PIP? In order to reflect these contextual realities in this study, market unfairness is thus included in the model to explore its hypothesized dampening effect on the relationships of QMP-PIP and EO-PIP, rendering the research outcomes more relevant to the contextual background.

The second moderating variable chosen for this model is policy support, which reflects the perceived degree of assistance and support that the incumbent firms receive from governments and their agencies. While supportive policies are always conducive to private research and development (R&D) efforts which by nature are risky, the importance of policy support is even more crucial in transitional countries such as China due to the more important role of government in resource allocation. Without favourable policy support and treatment, private innovation efforts in China may encounter asymmetric difficulties and this hurts PIP. Thus, it is reasonable to ask: does a favourable policy context further strengthen the proposed causation effects between QMP and EO on PIP? If so, how strong is the stimulating strength of policy support? For shedding light on these questions, policy support is included in this model to examine its potential stimulating effect on QMP-PIP and EO-PIP links.

The final moderating variable included in this study is competitive intensity, which indicates the perceived level of competitive threat from other rivals within a sector. The reason for studying this contextual factor is that competitive intensity of an industry is often suggested to be associated with the innovation performance of its incumbents. While some suggest that high competition intensity promotes innovation efforts and outcomes, others argue for a more complex contingent relationship. Also, fierce competition is also observed in many sectors in China, and this is particularly true for the electronics hubs in the Pearl River Delta (PRD) due the industry's very high concentration there. Therefore, inclusion of competition intensity into the model will clarify the role of competition intensity on EO-PIP and QMP-PIP in the case of

HKEI in the current PRD context.

1.3 Research questions and objectives

This study aims to address the following questions:

I. How does entrepreneurial orientation influence the product innovation performance of Hong Kong electronic firms in the Pearl River Delta (PRD) region?

II. How do these firms' quality management practices influence their product innovation performance?

III. How does the managers' perception of market unfairness affect the association between EO and PIP?

IV. How does the managers' perception of policy support affect the association between EO and PIP?

V. How does the manager's perception of competition intensity affect the association between EO and PIP?

VI. How does the managers' perception of market unfairness affect the association between QMP and PIP?

VII. How does the manager's perception of policy support affect the association between QMP and PIP?

VIII. How does the manager's perception of competition intensity affect the association between QMP and PIP?

IX. What managerial actions and practices are required of HKEI firms for their improvement in product innovation performance?

1.4 Research design

This study uses a survey method to collect data from managers of firms in the Pearl

River Delta (PRD) region in south China. The data will be used in a Structural Equation Modelling (SEM) analysis to test the research hypotheses. Chapter 3 explains this methodology in more detail. Table 1.1 below offers a summary of research design and methods.

Table 1.1

Research Design Summary of this Thesis

Research orientation	Applied business research
Research approach	Quantitative-empirical
Data used	Using primary data for survey analysis with secondary data for interpretation and discussion.
Independent variables	Entrepreneurial orientation, Quality improvement practices
Dependent variable	Product innovation performance (PIP)
Moderating variables	Policy Support; Perceived market unfairness Market competitive intensity
Target population	Hong Kong electronic manufacturing firms operated in Southern China with active product development and manufacturing activities
Sampling frame	Registered firms on Hong Kong Electronic Industry Federation Directory abd supplemented by other publicly available record
Sampling method	Simple random sampling
Sample size	222 firms responded in this study, and this meets the required sample size 200-500 for the purpose of structural equation modelling (Hair et al., 2010; Harzing, 1997)
Survey Instrument	Likert scale items (7 points) for each construct adapted from past published journal papers
Nature of data collected	Self-administered survey
Data collection method	Mail survey
Data analytical methods	Structural Equation Modelling (SEM) with AMOS

1.5 Implications

Although there are several similar recent studies on QMP and PIP (e.g. Feng et. al., 2006; Hung et. al., 2011; Kim et al., 2012; Ooi et. al., 2012), this study is a new and distinctive contribution as it examines several unexplored issues. These are summarized below:

I) The role of EO in facing external challenges and on PIP in quality management practising organizations. While the EO-PIP and quality-PIP relationships have separately been explored, the combined EO-quality effect on PIP has not been studied despite some recent studies on the relationship between QMP and PIP (e.g. Arostegui, Sousa and Montes, 2013; Honarpour, Jusoh and Nor, 2012; Zehir et al., 2012).

II) Previous studies on similar subjects do not cover the specific context of Hong Kong manufacturing firms in the PRD region of China, and it is unclear if previous findings are applicable to the HKEI-PRD context given its transitional nature (Choi, Lee and Williams, 2011).

III) The model developed in this study includes environmental hostilities commonly encountered by Hong Kong manufacturers, and specifically the HKEI firms, in the PRD. As a result, the findings from this study are more realistic than similar studies that do not include exogenous factors (e.g. Al-Swidi and Mahmood, 2012). This is critical as market unfairness, policy support and competitive intensity are specifically pertinent to a fast-changing industry operating in a transitional economy setting (Guan et. al., 2009; Liu, Woyode and Xing, 2012; Peng and Luo, 2000). This brings another contribution to the practice as decision makers are informed with findings and recommendations that have been tested with external factors they often face.

IV) This DBA thesis aims to fulfil its mandate of advancing professional practices by offering evidenced-supported advice to managers. These recommendations range from market-technology opportunities searching and evaluation, to organizational design and coordination for an entrepreneurial orientated PIP (EO-PIP) process, to executive development and training approaches for EO-PIP, an organizational roadmap for organizational change, and issues/practices on how to integrate quality management -continuous improvement systems for product innovation . While this study is not written as a handbook for the above activities, it serves as a starting point and a publicly accessible resource for those who seek insights in these matters.

1.6 Organization of this thesis

This thesis is organized into five chapters as follows:

Chapter 1 Introduction:

The first chapter begins with a brief description of the HKEI and current challenges to the industry. Research orientation, purpose, research questions and objectives are then defined and stated. Next the proposed research design and its rationales are summarized. Significance and contributions of this study are then discussed.

Chapter 2 Literature Review

This chapter begins with HKEI background in the 21st century business environment, with a particular focus on the industry's outlook in the PRD. Then a review of literature in the field of innovation, with a special focus on PIP is presented. A survey of quality management and entrepreneurial orientation literature is introduced. The bodies of literature in policy or institutional support, market unfairness and competition intensity are each examined, and their respective relationships with PIP are also reviewed.

Chapter 3 Research Methodology

This chapter begins with an introduction to the research paradigms and justifications for adopting the quantitative approach in this research. The conceptual model and operationalization of variables are then presented, and the research hypotheses developed are stated. Questionnaire design decisions are explained. Lastly, the rationale for data analysis techniques in this study is argued, with the assumptions, conditions and procedures of SEM explained in the context of this study.

Chapter 4 Data Analysis and Results

Chapter 4 begins with a description of the data and analysis of responses to the survey, it then follows by a data cleaning and screening process to make sure that data meet the requirements of the SEM. Then confirmatory factor analysis (CFA) of the model is performed, with tests of validities, as a prior step for structural analysis of the proposed model.

The structural model of the two major hypotheses (EO--PIP and QMP--PIP) is tested for model fit and their paths are then examined with a post hoc test performed. Afterwards, a structural model with moderating variables is developed for testing the moderating effects of policy support, market unfairness and competition intensity on the two main hypotheses and findings are summarized at the close of the chapter.

Chapter 5 Conclusions, Recommendations and Limitations

The final chapter begins with a brief conclusion of chapter 4's findings, then follows with discussion and comparisons with past research; explanations are suggested in the light of new findings and unexpected results. A series of managerial actions and practices are suggested, including suggestions for improving an entrepreneurial mind-set among managers and specific actions for harnessing quality management system/practices for facilitating PIP. Lastly, limitations of this study are identified especially in aspects of the conceptual model or research design, and application issues are discussed. Future directions for research and practice development are also suggested.

CHAPTER TWO

LITERATURE REVIEW

This chapter is organized in five sections. In the first section, the background of the Hong Kong electronic industry (HKEI) is introduced, together with a brief discussion of its development, transition and challenges in the Pearl River Delta (PRD) region. The second section offers a survey of the innovation literature and the definition of product innovation performance. In the third section literature of entrepreneurial orientation and its relationship with product innovation performance are reviewed. Next, in the fourth section, the major aspects of the quality management practices, and the relationship between quality management and product innovation performance are discussed. The final section explores the literature onconcepts of policy support, competition unfairness and competition intensity and their role in the relationship between EO, quality management and product innovation performance is reviewed and synthesized

2.1 Hong Kong electronics industry in Pearl River Delta

2.1.1 Hong Kong Electronics Industry

The Hong Kong electronic industry (HKEI) is a major pillar of Hong Kong's manufacturing export sector and contributed around 58% of total exports in 2012, grossing at US$256 billion (Chu, 2013b; Wong, 2013). About 75% of outputs of the industry are electronic components or semiconductors, and finished goods constitute the remaining 25% of its output (Chu, 2013b). The main categories of finished goods range from household appliances, audio-video equipment, telecommunication equipment, computers, mobile devices and related products (Chu, 2013b; Hong Kong Electronic Industry Association, 2012). A majority of components are exported for finished goods manufacturing in mainland China, particularly in the Pearl River Delta close to Hong Kong's border, and distributed to the mainland China domestic market, and overseas markets such as the European Union, North America and Southeast Asian countries (Chu, 2013b).

2.1.2 Hong Kong Electronics Manufacturing in Pearl River Delta (PRD)

Hong Kong's industrial development has been closely tied to the opening and economic reform of China in the last 30 years (Zhao, Chan and Ramon-Berjano, 2012). The majority of Hong Kong manufacturers have relocated their production facilities to the Chinese mainland where most manufacturing operations are conducted. Whereas research and development (R&D), marketing and corporate administration functions remain at their headquarters in Hong Kong. HKEI also followed this pattern and many firms relocated electronic plants that are concentrated in the Guangdong Pearl River Delta (PRD) region around three industrial cities----Dongguan, Huizhou and Shenzhen (HKTDC, 2008). These clusters also host a high concentration of Chinese electronic plants as well as Taiwanese and multinational production facilities (Schiller, 2011).

The formation of these clusters has been a result of 30 years of economic reform in this southern province of Guangdong (Diez, Schiller and Meyer, 2013) where incentive policies, ample supply of low cost migrant workers from poorer provinces and the entrepreneurial network of Hong Kong and overseas Chinese businesspeople all play important roles (Man and Lau, 2005; Sharif and Tseng, 2011).

Since China launched its 'Open Door Policy' for economic reform and modernization, HKEI, like other Hong Kong manufacturing industries, has been operating a 'front office-back factory' mode of division of labour on both sides of the border (Diez et al., 2013; Sharif and Tseng, 2011). Under the logic of this mode of production, manufacturing activities are located in China to take advantage of its lower costs of production, while marketing, R&D, corporate headquarters and other business support activities stayed in Hong Kong to take advantage of the metropolis' global exposure, well-developed legal and financial systems, excellent infrastructure and free access to information (Diez et al., 2013).

As Tban and Ng (1995) commented, this type of cross-border industrial operation is the combined result of Hong Kong's government laissez-faire industrial policy, the availability of direct foreign investment (FDI) opportunities in proximate regions in southern China, and the comparative advantage of Hong Kong in accessing global capital, information and talents. Shen (2003) also suggests that since Hong Kong was returned to mainland China, under the 'one country-two system' in 1997, the cross-border linkage between the two economies has been further strengthened due to the close demographic and cultural ties of the two societies. With these influences, electronics clusters have developed in the PRD region, and Hong Kong firms together with Taiwanese and multinational counterparts, have become major players in these electronic factory towns (Yang, 2012).

2.1.3 Challenge under industrial restructuring in PRD

The HKEI-PRD cross-border industrial partnership model has brought benefits to parties on both sides of the border. Yam et al. (2011) point out that by this arrangement southern China enjoys technology transfer, capital infusion, high employment and GDP growth. On the other hand, due to the support of PRD's integrated and flexible electronics supply chain, Hong Kong electronic firms are able to compete globally on low production cost (Yam et al., 2011), and this arguably reduces HKEI's motivation to innovate.

Though this cross-border partnership remains in force, this arrangement now faces unprecedented challenges as the competitive advantages for HKEI are being eroded by several endogenous and exogenous changes (Eng, 2009; Yang, 2012; Zhao et al., 2012). PRD production costs are expensive compared with inland provinces and nearby competing countries such as Vietnam (Einhorn, 2013; Sharif and Huang, 2012), and therefore the Guangdong government has pursued a 'dual-track policy': low-end industries are pressurized to phase out while high tech, high value adding industries are encouraged, This is locally known as the policy of "emptying the cage for new birds"（騰籠換鳥) (Chu, 2013a; Yang, 2012).

Hong Kong firms are particularly and severely challenged under this new directive (Chu, 2013a; Eng, 2009; Yang, 2012; Sharif and Huang, 2012) as they have been reluctant to commit to innovation (Baark and Sharif, 2006; Sharif and Baark, 2005) and thus lag behind their Taiwanese counterparts in adapting to PRD's innovation drive (Yang, 2012; Yeung, 2007). Altenburg, Schmitz and Stamm (2008) point out that even some Chinese domestic firms are replacing HKEI's position in Original Equipment Manufacturing (OEM), and shifting towards an Original Design Manufacturing (ODM) mode of business (Schott, 2008; Yeung, 2007). The gap in competitiveness between Hong Kong firms and other PRD incumbents is thus further widened.

Policy hostility and decline in competitiveness are not the only challenges posed to HKEI. After 30 years of industrialization and one-child-policy, the 'population dividend' or the once-unlimited low cost labour supply is also under strain (Feng, 2011; Golley and Tyers, 2012). Younger generations of the population also have a stronger abhorrence for monotonous manufacturing jobs, and all these factors escalate the labour costs further (Chan, 2010). In summary, HK electronics firms operating in PRD have been losing their factor cost advantages, while relatively few are ready to adapt to the challenge of manufacturing upgrading.

2.1.4 Opportunities for collaborations within Pearl River Delta

Despite the external threats, HKEI is still able to strengthen its competitiveness through leveraging several resources and opportunities that are readily available to them. First, the PRD remains one of the few electronics manufacturing hubs in the world that can boast of a full scale and integrated supply chain (Meye et al., 2012). Baark and Sharif (2006, 2008) point put that Hong Kong manufacturers stand a better chance to compete not by merely exploiting factor cost differences in China, but by exploiting and integrating with the innovation system and resources in PRD (Yam et al., 2011).

Facilitating supply-chain collaborative innovations, such as supplier-customer co-development of products, is one example (Lau, Tang and Yam, 2010), while another possible option is to initiate innovation collaborations with universities, research institutions or science parks in mainland China, as suggested by Sharif and Huang (2012). China has emerged as an innovation powerhouse in Asia in terms of patents filed annually (Lau, Kong and Baark, 2012), though the country is still weak at commercialization of innovation outcomes (Orr and Roth, 2012). This is an area where Hong Kong firms still enjoy comparative advantages over their counterparts, especially in business-to-consumer contexts (Orr and Roth, 2012).

2.1.5 The Chinese structural reform in the early 21st Century

The Chinese central government is fully aware of the hefty price of reliance on low-cost manufacturing and exporting. Commentators argue that China has already reached the "Lewis Turning Point", a phenomenon first suggested by Nobel-prize laureate Sir Arthur Lewis (Cai, 2010; Zhang, Yang and S Wang, 2011). According to this theory, during the turning point the rural population of an economy will eventually be fully adsorbed into its industrial sector, leading to wage increases and the need for restructuring to a capital-intensive economy (Cai, 2010). In short, China's low cost labour is dwindling and unable to sustain its low-cost production economy for much longer (Das and N'Diaye, 2013). At both macroscopic and firm levels, China needs to become its own source of innovation to compensate its increased factor costs (Peng, 2011). Besides an unsustainable demography for economic growth, environment damage is another major crisis as major Chinese cities are plagued with smog coming from coal-burning and car emissions (Zhang and Wen, 2008). China urgently needs to transit from current malpractices to a new model of high value adding and sustainable production.

Against these looming crises and for catching-up with advanced rivals, the Chinese central government announced its Twelve 5 Year Plan (the "12-5 Plan") which spans from 2011 to 2015, in which a more sustainable and competitive China is envisioned (Fu, Pietrobelli and Soete, 2011; KPMG China, 2011). Under this plan, industries that are 'strategic' and 'emerging' are to be supported and encouraged through fiscal, administrative and supply side incentives (Jin, Lu and Zhou, 2011). Sectors identified include: renewable energy sources, pharmaceutical/biotechnology, environmental management, information technology, high technology research and development, intelligent manufacturing and clean transportation.

Another important aspect of the 12-5 Plan is that of rebalancing the engine of economic growth from export to domestic consumption (Fukumoto and Muto, 2012; Chen and Partridge, 2013). Under this major structural reform, rapid urbanization of the rural regions as well as expansion of the service sector are envisioned to provide new employment opportunities, increased domestic consumption and higher income levels (Woo, Lu and Sachs, 2012; Yuan, Wan and Khor, 2012). Observers comment that these positive effects lead to a rise of the middle class, which has a huge appetite for higher end products and services (Yuan, Wan and Khor, 2011), and provide impetus to the innovation upgrading of the Chinese manufacturing industry. By this logic, the proposed cycle of structural reform repeats.

2.1.6 Opportunities for Hong Kong industries under Chinese restructuring

This economic and industrial upgrading in China carries several important implications for Hong Kong business; the demand created by this momentous change offers Hong Kong electronic firms opportunities to participate in China's transformation. First, Hong Kong electronic firms are able to collaborate with their mainland counterparts to develop and market commercially successful products under the 12-5 regime and beyond (Orr and Roth, 2012). Second, the new economic needs in China offer entrepreneurial HKEI firms opportunities to build new niches in the coming market landscape. An example of this is electric/hybrid vehicle technology (Wong and Choy, 2012). Third, replacing old industries and equipment for a low carbon economy also creates demands for newer more efficient substitutes, such as light emission diode (LED) lighting (Yang, 2014). Fourth, as Hong Kong businesses are more adept at exploring marketing needs, stylish product design and creating brand identity for their products, HKEI can capitalize on the fast-rising affluent population and their needs for world-class consumer electronics and technological products (Chu, 2013 a & b). Lastly, as HKEI enjoys free access to global information and insight, the industry is well placed to orchestrate cross-border or global innovation projects and industrial supply chains (Baark and Sharif, 2006).

In summary, HKEI has reached the critical point for changing its cost-based mentality to a paradigm of innovation-focused competition. China's economic and industrial upgrading provides a timely opportunity to accelerate change within Hong Kong firms, and the HKEI should be able to benefit from the Hong Kong-PRD cross-border partnership. Some questions remain, however, about specific strategies for HKEI firms to implement ways of raising their competitiveness in product innovation performance (PIP). In the following sections, the roles of entrepreneurial orientation of firm and quality management practices to PIP are discussed. A firm willing to take risks, explore opportunities and innovate, operating with a quality management system, can be argued to have superior product innovation performance.

2.2 Innovation

2.2.1 Nature of innovation

Innovation is generally understood as the application of original, new or exotic ideas, technologies or knowledge for the better satisfaction of existing, unmet or potential needs of the users and society (Perez-Luno, et al., 2011; Frankelius, 2009; Utterback and Abernathy, 1975). it often leads to the disruption of existing economic, social and technological order at the expense of creating new ones (Bergek et. al., 2013; Christensen, Horn and Johnson, 2008; Quinn, 1985; Schumpeter 1943). Innovation is manifested through better or more effective products, processes, services, business models, ideas or technologies that enter a market or society (Frankelius, 2009).

One particular aspect of the innovation literature is the different definitions and classification suggested by different researchers (Baregheh, Rowley and Sambrook, 2009, Garcia and Calantone, 2002). Within the field, innovation is conceptualized with diverse interpretations, and the following is a brief account of some of these views on the nature of innovation.

2.2.1.1. Schumpeterian-Kirznerian economic view of innovation

In today's turbulent and dynamic competitive environment, innovation plays an even larger role for long term existence and business success (Galindo and Mendez-Picazo, 2013; Drucker, 1985). One of the earliest explanations of innovation stemmed from the Austrian economic theories of Schumpeter and Kirzner, who linked the relationship between entrepreneurs, innovation and economic prosperity (de Jong and Marsili, 2011; Galindo and Mendez-Picazo, 2013). Both theories emphasize the role of entrepreneur in discovering opportunities and bringing new means or innovation to satisfy created demands, though they differ in their views of the source of these entrepreneurial opportunities, and how entrepreneurs recognize and make use of these opportunities (Ardichvili, Cardozo and Ray, 2003; Kirzner, 2011).

Schumpeter (1934) argued that organizations need to continually renew themselves through 'creative destruction' for survival and long term performance, and the evolution of the economy. Schumpeter (1943) further asserted that entrepreneurs play a crucial role in promoting innovation; the searching for better products and service offerings to customers necessitates pioneering of new technologies and business practices (de Jong and Marsili, 2011). Schumpeterian firms are technology-driven and have access to novel technological knowledge (Block, Thurik and Zhou, 2013; Siegel and Renko, 2012) which is then commercialized into radically new products (Cromer, Dibrell and Craig, 2011), and create new and disruptive market demands. Linking Schumpeterian innovation to the perspective of entrepreneurial orientation (EO), technology-driven firms manifest strongly on both the dimensions of *innovativeness* or propensity to innovate (Perez-Luno et al., 2011; Siegel and Renko, 2012), and *risk-taking* as creating new uncertain markets requires managers’ willingness to commit on risky business opportunities (Boso, Cadogan and Story, 2012; Lumpkin and Dess, 1996; Sundqvist et al., 2012).

On the other hand, Kirzner (2011) sees the primary roles of a entrepreneur as identifying arbitrage opportunities in existing market conditions, and developing solutions or innovations to exploit these lesser-known opportunities for entrepreneurial rents (Cromer, Dibrell and Craig, 2011; de Jong and Marsili, 2011). The key of successful Kirznerian entrepreneurship thus hinges on the entrepreneur’s asymmetric market knowledge (Siegel and Renko, 2012), especially during turbulent market conditions (Sundqvist et al., 2012), thus enabling them to outperform competitors. Quintessentially, this ability to detect subtle market signals and exploit latent needs in the market is referred as *proactivity* in EO terminology (Perez-Luno, Wiklund and Cabrera, 2011; Sundqvist et al., 2012). Since the Kirznerian innovating firm also attracts competitors to follow suit, the firm needs to continue seeking new asymmetric opportunities and aggressively exploit them quickly by creating new products, processes or business models, and all these actions reflect *aggressiveness* in the EO field (Siege and Renko, 2012; Sundqvist et al., 2012). Since Kirznerian firms develop new products in response to market conditions, product innovations are incremental in nature as they reflect the evolutionary trajectory of market-driven needs (Cromer, Dibrell and Craig, 2011).

In todays’ interactive exchanges between market and firms (Dahlander and Gann, 2010), a synthetic interpretation of the two economic perspectives of innovation sources suggests that prior technological and market knowledge are necessary in delivering technological and commercially successful products, (Di Stefano, Gambardella and Verona, 2012). Hence, the adaptive entrepreneurial firm should continuously rebalance its focus on the two sources of innovation, according to the relative maturity of market sophistication and technology development (Autio et al., 2014; Peltoniemi, 2011).

2.2.1.2. Utterback's industry life cycle view of innovation

Utterback (1971) put forward a technologist view that innovation is closely linked with industry life cycles, whose reiterations continually bring in disruptions to the dominant designs/technology and the industry competitive dynamics (Abernathy and Utterback, 1978; Anderson and Tushman, 1990; Utterback and Suarez, 1993). Firms experimenting with the right emerging technologies or 'dominant design' have a higher chance to survive, and even dominate the new industry (Christensen, Suarez and Utterback, 1998; Maine, Thomas and Utterback, 2014; Utterback and Suarez, 1993). During the three different phases of each cycle, incumbents have to make different innovation decisions on products, processes and organization structure in tune with the industry's evolution as illustrated in table 2.1 (Utterback, 1994).
Table 2.1 summarizes Utterback's view of the endogenous technological innovation process of the firm interacting with the environment. In his view, the effectiveness of a firm's innovation is a function of competition condition of its environment, the internal characteristics of its organizational ecology, and the decision-interaction between the firm and other players (Tavassoli, 2014; Utterback, 1971 &1994). In the early fluid stage, the more entrepreneurial firms focus on radical technological breakthroughs and experiment with their products in the market, where typically no dominant design has yet emerged, and firms are typically highly organic and small to stay agile (Autio et al., 2014; Peltoniemi, 2011; Tushman et al., 2010; Utterback, 1994).

Table 2.1

Characteristics and foci of three phases of Utterback's dominant design cycle

Focus	Fluid Phase	Transitional Phase	Specific Phase
Innovation	Product changes/ radical innovation	Major process changes/ architectural innovations	Incremental innovations/ improvement in quality
Product	Different designs/ Customization	Less differentiation	Product standardization
Competition	Many small firms, No direct competition	Many, but declining after emergence of dominant design	Few, oligopoly
Organization	Organic, entrepreneurial	Formal structure with task Groups	Hierarchical
Threats	Old technology, entrants	Imitators and successful product breakthroughs	New disruptive new technologies
Process	Flexible and inefficient	Changes occur in large steps	Efficient, rigid and capital intensive

Source: Utterback (1994)

After the natural selection among the various competing technology forms and formats, dominant design emerges (Argyres, Bigelow and Nickerson, 2013) and the focus of innovation falls on to architectural innovation, to reconfigure the product platform of existing modules (Henderson and Clark, 1990; Magnusson and Pasche, 2014), and this development trend shakes out incumbents choosing the less accepted product platforms (Argyres, Bigelow and Nickerson, 2013; Bos, Economidou and Sanders, 2013). The combined complexities arising from innovation at this stage also necessitate formal organizational forms, with an emphasis for better cross-functional coordination to deal with conflicting demands (Tavassoli, 2014; Tushman et al., 2010). Eventually, as product technology development approaches its maturity, emphasis is placed on incremental and modular innovation for better performance and quality, and little differentiation is observed among the competing offerings (Bos, Economidou and Sanders, 2013; Tavassoli, 2014; Utterback, 1994). To match technological change, internal structure of the incumbents tends to be hierarchical for exploitative performance (Tushman et al., 2010), and foreshadows a risk of overlooking emergence of disruptive technologies that substitute the whole industry

(Bos et al., 2013; Christensen, 2013; Utterback, 1994).

Utterback's organization-market-technology view of innovation evolution gives managers a more detailed and comprehensive framework for decision making and focus for efforts, though it is daunting for a firm to continuously rebalance its socio-technical structure with its contemporary innovation agenda (Tushman et al., 2010). Specifically, this requires high vigilance by the firm of its technological and market undercurrents (Engelen et al., 2014), ability to differentiate false alarms and identify genuine windows of opportunity (Hakala, 2011). The firm must be confident to commit on decisions and convictions for novel ideas (Hakala, 2011), while at the same time be skilful enough to integrate exploitative and explorative efforts to stay competitive (Tushman et al, 2010) - and all the above are also the characteristic benchmarks of an adaptive entrepreneurial firm (Lumpkin and Dess, 1996). In other words, though Utterback's framework is comprehensive for guiding decisions and adaptation throughout the cycle, the successful execution for contingent decisions hinges on whether the innovating firm manifests entrepreneurial actions, decision-style and perception (Engelen et al., 2014; Hakala, 2011; Sundqvist et al., 2012; Sciascia et al., 2014).

2.2.1.3 Dynamic capabilities view of innovation

The concept of dynamic capabilities is complex and abstract (Winter, 2003). The theory's origin began with Teece, Pisano and Shuen's influential paper (1997), which defined dynamic capabilities as "the ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." This dynamic capabilities view assumes that the resource base of a firm becomes obsolete, and has the potential to become core rigidities (Gilbert 2005; Leonard-Barton, 1992;

Prange and Verdier, 2011). According to this theory, it is necessary for organizations to continuously modify their internal routines and resources, as well as their managers' cognitive models of the external world, to create innovative sources of sustainable competitive advantage in a 'high-velocity' environment (Barreto, 2010; Eisenhardt and Martin, 2000; Kor and Mesko, 2013; Lawson and Samson, 2001; Teece, 2007). Essentially, dynamic capabilities are a set of routines that enable reconfiguration, learning, integration and coordination of assets (Teece et al., 1997), as well as sensing and seizing opportunities in the environment for explorative firm performance (March, 1991).

The theory of dynamic capabilities overlaps with the resource-based view (RBV) of firm, organizational learning, absorptive capacity, ambidextrous and evolutionary perspectives of organization (Barreto, 2010; Cohen and Levinthal, 1990; McKelvie and Davidsson, 2009; Nonaka and von Krogh, 2009; O'Reilly and Tushman, 2013; Wang and Ahmed, 2007; Zahra and George, 2002); it also offers a broader interpretation of the nature of innovation (Barreto, 2010; Pavlou and Sawy, 2011; Rothaermel and Hess, 2007; Salunke and Weerawardena, 2011). Essentially, this theory recommends managers to: 1) become fully aware of their mental models in relation to reality and the organization's path; 2) communicate and exchange among members for the new paradigm; 3) orchestrate, recombine and synergize new knowledge- and resource-based resources and capabilities; 4) promote behaviours, routines and other microfoundations to innovate and leverage on new opportunities and; 5) be ready to manage ambidextrous innovation streams continuously (O'Reilly and Tushman, 2004, 2008, 2013; Teece, 2010; Tushman et al., 2010; Vergne and Durand, 2011; Weerawardena and Mavondo, 2011).

Despite the prolific academic interest in dynamic capabilities, Pavlou and El Sawy (2011) conclude that the concept remains abstract, with lack of precise definition and casual evidence for existence, and lacking conceptually valid measurement (Arend and Bromiley, 2009; Williamson, 1999; Zahra, Sapienza and Davidsson, 2006). Priem and Butler (2001) even criticize the concept as being tautological for its suggested connection to business performance. The poor understanding of dynamic capabilities also hinders progress in empirical studies lacking its theoretical development and makes managerial application difficult (Pavlou and Sawy, 2011).

To overcome this lack of a coherent measurable model of dynamic capabilities, Pavlou and Sawy (2011) proposed operationalizing dynamic capabilities as a set of explorative routines (March, 1991) leading to renewal and reconfiguration of operational capabilities, which are exploitative routines for on-going economic performance (Winter, 2003, Teece, 2007). Four capabilities are conceptualized as the constituent capabilities – these are: 1) *sensing*; 2) *learning*; 3) *integrating* and 4) *coordination* capabilities (Pavlou and Sawy, 2011). Sensing capability includes routines that generate, disseminate and respond to market intelligence (Pavlou and Sawy, 2011; Teece, 2007, 2010), while learning capability is conceptualized as "routines in acquiring, assimilating, transforming and exploiting knowledge" into operational capabilities (Pavlou and Sawy, 2011, p244; Zahra and George, 2002). Integrating capability involves embedding new individual knowledge into new operational capabilities, and coordinating capability is proposed as a set of routines that "orchestrate, deploy tasks, resources and activities in the new operational capabilities" (Eisenhardt and Brown, 2000; Helfat and Peteraf, 2014; Pavlou and Sawy, 2011, p246).

The relationship between dynamic capabilities and product innovation is closely related (Prieto, Revilla and Rodriguez-Prado, 2009; Weerawardena and Mavondo, 2011; Zahra et al., 2006). Product innovations start from opportunities detected by sensing, recognition and the intention to act upon market and technological changes (Helfat and Peteraf. 20-14; Teece, 2007; Winter, 2003). To capitalize on technological or market changes, new solutions and knowledge have to be created and existing operational capabilities have to be reconfigured which necessitates the use of learning capability (Helfat and Peteraf, 2014; Helfat and Winter, 2011; Zahra et al., 2006). Integrating and coordinating capabilities are also required in product innovation as knowledge and ideas have to be shared within the innovation units (Helfat and Peteraf, 2014; Pavlou and Sawy, 2011, Teece, 2007), and this facilitates eventual setting up of R&D task forces, resource recombination and cross-functional efforts (Helfat and Winter, 2011).

Dynamic capabilities theory is complementary to the industry life cycle's view, as it stresses a greater emphasis on the firm's role in innovation via endogenous knowledge orchestration (Kor and Mesko, 2013; Zahra et al., 2006). Since dynamic capabilities can be conceptualized as a number of capabilities of reconfiguring socio-technical routines (Pavlou and Sawy, 2011; Teece, 2007), this model gives managers a clear picture, focus and responsibility of how innovations are created within the organization (Helfat and Peteraf, 2014; Pavlou and Sawy, 2011). On the other hand, the industry life cycle theory informs managers on the loci of their attention, purposes and efforts during execution of dynamic capabilities routines at each stage of industry evolution(Dao and Zmud, 2013); along the stages of life cycle different determinants (e.g. technology or market) influence innovation propensity variably (Dao and Zmud, 2013; Tavassoli, 2014).

Finally, when juxtaposing the product innovation viewpoints from entrepreneurial orientation and dynamic capabilities perspectives, both approaches encourage opportunity recognition, mobilization for opportunities and resource exploration (Arend, 2014; Liu et al., 2012; Lumpkin and Dess, 1996; March, 1991). This suggests that EO is a type of dynamic capability (Bhuian, Menguc and Bell, 2005; Liu et al., 2014; Pavlou and Sawy, 2011) and further strengthens the evidence of the EO--product innovation linkage (Alegre and Chiva, 2013; Miller and Friesen, 1982; Perez-Luno et al., 2011; Woldesenbet, Ram and Jones, 2012).

2.2.2 Types and classification of innovation

In this section, these related concepts are clarified briefly, though many of these constructs are overlapping in nature. In communicating these concepts, it is essential to embrace their multidimensional characteristics.

Classification of innovation can be traced back to Schumpeter's work (1934); he distinguished five types of innovation: new products, new production processes, new supply sources, new markets and new organizational practices (Diaconu, 2011; Drejer, 2004). Early works such as Downs and Mohr (1976) raised the issues of inconsistency in innovation research and they attributed one source of inconsistency as due to the existence of innovation types. They suggested the use of primary attributes (regarding the nature of innovation itself such as high or low cost) and secondary attributes (which are contextual characteristics of the innovation adoption environment, such as organizational size) to classify innovation types. Downs and Mohr (1976) assert that consistency of primary and secondary attributes in a research design is one way to improve findings comparability. The sources of different innovations are both endogenous and exogenous: Nelson and Winter (1977) suggested different selection environments such as technological impetus, demand-pull and institutional demands give rise to innovation varieties. Miller and Friesen (1982) conclude that interaction between different strategic choice and environmental factors foster distinctive innovations. Dosi (1982) further discusses the interplay between technological trajectory, technical discontinuities and market selection, and their subsequent determination to the incremental or radical nature of innovations.

In the extant innovation literature, the subject is studied at different levels: products, processes, markets, organizational and national/regional are particular foci of interest (Adams, Bessant and Phelps, 2006; Garcia and Calantone et al., 2002; Damanpour and Wischnevsky, 2006; Rowley, Baregheh and Sambrook, 2011), and overlapping typologies are suggested by different scholars (Crossan and Apaydin, 2010; Gopalakrishnan and Damanpour, 1997). For example, in a cross-disciplinary review, by Gopalakrishnan and Damanpour (1997) suggest that innovations can be classified into six types, namely products, process, radical, incremental, technical and administrative innovation.

Another common classification approach in innovation literature is the use of dichotomous descriptors to innovation type (Rowley, Baregheh and Sambrook, 2011). The first dichotomy is the product innovation vs. process innovation pair, which was identified and defined in earlier models (Knight, 1967; Utterback and Abernathy, 1975). Product innovation focuses on the development of new products or services for meeting customers' needs (OECD Oslo Manual, 2005; Utterback and Abernathy, 1975) while process innovation improves the internal efficiency, quality and operational performance of the organization (Knight, 1967; Davenport, 2013).

The second dichotomy is the classification of innovation in terms of radical vs. incremental, the degree of change and newness of the innovation (Crossan and Apaydin, 2010; Dewar and Dutton, 1986; Ettlie, Bridges and O'Keefe, 1984). Radical innovation is disruptive in nature and brings about fundamental change, while incremental innovation builds on previous designs through introduction of new functionalities or upgrading performance (Chandy and Tellis, 2000). An offshoot of this dichotomy is a spectrum popularized by Christensen (1997, 2003) between disruptive innovation vs. sustaining innovation. Disruptive innovation, unlike radical innovation, often employs existing off-the-shelf components but its often simpler architecture offers new values to emerging markets, and ultimately displaces existing markets (Christensen, 2003). On the other hand, a sustaining innovation does not affect existing markets, and has two sub-categories: evolutionary/continuous and revolutionary/discontinuous innovations (Christensen, 1997, Yu and Hang, 2010). In other words, in Christensen's terminology, incremental (evolutionary) and radical (revolutionary) innovations are both categorized as sustaining innovation as long as no new market is created (Ansari and Krop, 2012; Yu and Hang, 2010 & 2011).

Regardless of typologies involved, all innovation activities require the capture of new ideas, concepts and generation of knowledge, as well as materializing these inputs into successful products and processes in the market (Crossan and Apaydin, 2010; Rowley, Baregheh and Sambrook, 2011). As this study focuses on the relationship between product innovation performance and quality management and entrepreneurial orientation, the following sections will survey the literature pertinent to that specific measure of innovation.

2.2.3 Product innovation performance

2.2.3.1 Nature of product innovation

At the firm level, product innovation is the developing and delivering of new products that are technologically superior to the existing offerings (Atuahene-Gima, 2005; OECD Oslo Manual, 2005; 2011, Zhou and Fu, 2010). Depending on the degree of newness and impact on existing markets, product innovation is commonly categorized as incremental, radical or disruptive product innovation (Christensen, 1997, Yu and Hang, 2010). Incremental product innovation aims at improving or extending existing products; radical innovation focuses on delivering superior and alternative technology-based products to existing markets (such as hybrid cars) and disruptive innovation aims at creating new markets and industries (such as music streaming versus music CD) (Ansari and Krop, 2012; Yu and Hang, 2010 & 2011).

Product innovation involves a stream of tightly coupled activities stretching from generation of ideas, feasibility studies, research and development, manufacturing, project management as well as marketing efforts (Ettlie and Rosenthal, 2011; Chandy and Tellis, 1998). Successful product innovation requires a closely managed environment with both technology-push and market-pull interactions (Di Stefano, et al., 2012; Rothwell, 1994).

2.2.3.2 Literature of product innovation performance

Product innovation performance (PIP) refers to the extent and scope of an organization's innovation effort (input) and success (outcomes) for delivering technologically new products to the market (Kohler et al., 2012), and is an increasingly critical business outcome. Alegre, Lapiedra and Chiva (2006) point out that firms that are able to deliver new products faster, more efficiently and meeting customers' expectations more closely are more likely to have long term firm-level success (Brown and Eisenhardt, 1995; Calantone, Vickery and Droge, 1995). Product innovation essentially requires the firms to transform novel ideas into products through skilful mobilization of internal resources and operations (Atuahene-Gima, 2005; Teece, 2007; Zhou, Yim and Tse 2005). Therefore the degree of success of product innovation, namely PIP, can be conceptualized in terms of degree of product novelty ("innovation efficacy") and the efficiency of the innovation process or "innovation efficiency" (Alegre et al., 2006). Another common way to conceptualize PIP is to measure absolute quantifiable innovation process outputs (Parthasarthy and Hammond, 2002), such as number of new patents, products, services or processes created (Brouwer and Kleinknecht, 1999; Rosenbusch, Brinckmann and Bausch, 2011).

Authors generally comment positively on PIP's contribution to firm performance (e.g. Brown and Eisenhardt, 1995; Wheelwright and Clark, 1992), and recent meta-analysis conducted by Rosenbusch et al. (2011) provides additional revelations. This meta-analysis was on 42 studies of the innovation performance- firm relationship in 21,270 small and medium enterprises and it concludes that: the innovation process outputs (number of new products) are stronger predictors than process inputs (such as R&D spending) for firm-level business performance. This suggests that the (product) innovation process has to be managed closely so as to maximize outputs and not to squander innovation resources, which eventually has an impact to business performance (Rosenbusch et al., 2011). These findings resonate with the concept of innovation efficiency of operationalization of PIP (Alegre et al., 2006).

Another finding from Rosenbusch et al. (2011)'s meta-analysis is the importance of innovation orientation on firm performance, where they found a stronger positive impact on firm performance than innovation outcomes. Innovation orientation, as Rosenbusch et al. (2011) defined it, is an organizational positive attitude to environmental changes with a propensity to proactiveness and innovativeness, and is akin to EO (Alegre and Chiva, 2013; Lumpkin and Dess, 1996; Rosenbusch et al., 2011; Zhou, Yim and Tse, 2005). They cited theoretical support from the EO literature that an innovation oriented firm encourages new ideas, novelty and experimentation, and fosters a climate conducive to product and service innovation (Alegre and Chiva, 2013; Lumpkin and Dess, 1996). This firm is hence able to circumvent challenges by competing innovatively (Covin and Slevin, 1989; Rosenbusch et al., 2011). Rosenbusch et al. (2011) further elaborated that an innovation orientation also enables a firm to develop innovative capabilities (Alegre and Chiva, 2013; Branzei and Vertinsky, 2006), and be able to overcome resource scarcity through novelty processes or practices (Rosenbusch et al. 2011). Lastly, their findings also indicate that endogenous innovation inputs (e.g. internal R&D) have a stronger positive impact on firm performance than collaborative inputs (e.g. partnership) (Rosenbusch et al., 2011), which is contrary to the inter- organizational collaboration literature (e.g. Cohen and Levinthal, 1990; Lawson et. al., 2009; Song and Di Benedetto, 2008; Tsai, 2009), confirming innovation/entrepreneurial orientation as an antecedent to PIP (Alegre and Chiva, 2013).

Besides EO, other antecedents to PIP are identified and studied, though some studies employ the term product development performance to reflect the concept of PIP (e.g. Kahn, 2001). In Alegre and Chiva (2013)'s study, organizational learning capability was studied and supported as an antecedent to PIP with EO, indicating that EO cultivates organizational learning, leading to improved PIP and firm performance (see also others e.g. Zortea-Johnston, Darroch and Matear, 2012). Market orientation (MO) and EO were also investigated by Hong, Song and Yoo (2012) and the result suggested that market orientation influences product development proficiency stronger (process efficiency) and EO has a stronger impact on product novelty (Alegre et al., 2006; Prajogo and Sohal, 2004). Supplier technical proficiency was used by Cousin et al. (2011) as an antecedent to customer product development performance and the relationship was supported. This suggested that vertical collaborative innovation works when specialized knowledge resided in one partner while the other side has the absorptive capacity to excavate (Tsai, 2009; Zahra and George, 2002). Tsai (2009) studied the linkage between PIP and aggregated vertical collaboration, supplier collaboration, customer collaboration and competitor collaboration under the positive moderation of absorptive capacity; all antecedent—PIP links were found supportive and the role of learning capability of partners was emphasized. Corporate entrepreneurship—PIP relationship was studied and confirmed, indicating that venturing and renewal initiatives also benefit innovation outputs (Chen et al., 2014).

Luca and Atuahene-Gima (2005) reported that market knowledge depth and breadth both have direct and mediated effects on PIP through the mediator of the knowledge integration mechanism. These results again lend support to the role of knowledge base and the capability to assimilate and apply knowledge (Zahra and George, 2002). Zhou (2005) studied the direct effect of product strategy (innovation and imitation) on PIP under the moderation of demand uncertainty, technological turbulence and competitive intensity. It was concluded that product innovation strategy has a stronger positive effect on PIP, especially under market uncertainty, technological rapid changes and high competition intensity, leading some support to the notion that innovation orientation/EO is robust under external hostility (Miller and Friesen, 1982).

Zhou, Yim and Tse (2005) also studied the effects on two types of PIP (technology-based and market-based) of a number of predictors: EO, MO, organizational learning and three market forces of demand uncertainty, technological turbulence and competitive intensity. Technological orientation, defined as a tendency to create novel technological ideas and to adopt advanced technologies, is an extension from the EO concept but with a focus on hi-tech (Zhou et al, 2005). They reported that EO has strong positive direct effects on both market-based PIP and technology-based PIP, while MO have positive and weaker effect on technology-based PIP though the effect on market-based PIP (Zhou, Yim and Tse, 2005). Technological orientation only had a positive direct effect on technology-based PIP (Zhou et al., 2005).

Further evidence from Hung et al. (2011) concluded that total quality management has a direct positive and mediation effect on PIP, with organizational learning as a mediator, and a similar earlier study (Hung et al., 2010) suggested knowledge management initiatives have a positive direct and mediator effect on innovation performance under the mediation by total quality management. These two studies are of very special interest as they both studied total quality management, which is conceptually akin to one of the independent variable of this research, quality management practices (QMP). The linkage between QMP and PIP will be discussed in the later sections, though prior QMP-PIP studies (e.g. Prajogo and Sohal, 2004; Kim, Kumar and Kumar, 2011) indicate that QMP, when implemented, are able to exploit existing socio-technical resources and generate new knowledge (Choo, Linderman and Schroeder, 2007) through exploration (Wu, Zhang and Schroeder, 2011). This suggests that QMP may be regarded as a dynamic capability (Prajogo and Sohal, 2001; Molina-Castillo, Jimenez-Jimenez and Munuera-Aleman, 2011).

Absorbed and unabsorbed organizational slacks were examined by Liu et al., (2014) for their effects on PIP, under the moderation of EO. These authors reported that unabsorbed slack had a stronger direct positive effect on PIP under EO's moderation, while absorbed slack's positive direct on PIP was weaker under EO's moderation. They went on to explain that unabsorbed slack or fluid unassigned resources are more easily orchestrated by EO, a dynamic capability, thus more helpful to bring product innovations (Bhuian, Menguc and Bell, 2005; Liu et al., 2014).

The above review is only a small sample of recent literature on PIP and its antecedents, and several observations can be made from prior studies as a whole. First, most antecedents to PIP are related to strategic orientations or attitudes of the firm, such as EO (Alegre and Chiva, 2013; Avlonitis and Salavou, 2007; Hong et al., 2012; Li et. al., 2008; Perez-Luno et al., 2011; Zortea-Johnston et al., 2012) and MO (Hong et al., 2012; Zhang and Duan, 2010; Wei and Atuahene-Gima, 2009; Zortea-Johnston et al., 2012). EO's prominence in PIP studies can be explained by the firm's propensity of and tolerance for experimentation on novel or untried ideas (Lumpkin and Dess, 1996), which further explains why EO is especially supportive to product radicalness (e.g. Hong et al., 2012; Zortea-Johnston et al., 2012) and a similar logic can be extended to technological orientation (Zhou et al., 2005). MO has been suggested as having a stronger positive impact on incremental product innovation due to the exploitative nature of being market-driven (Narver, Slater and MacLachlan, 2004; Yalcinkaya, Calantone and Griffith, 2007; Zhang and Duan, 2010; Zhou et al., 2005).

Not only do the organizational attitudes and behavioural tendencies matter, extant studies on PIP also indicate that resources and the capabilities to explore and exploit these resources (March, 1991) were examined as antecedents (e.g. Alegre and Chiva, 2013; Cousins et al., 2011; Hung et al., 2010; Hung et al., 2011; Luca and Atuahene-Gima, 2005; Molina-Castillo et al., 2011; Zhou and Wu, 2010). When examining these resources such as absorbed and unabsorbed slacks (Liu, et al, 2014); capabilities such as organizational learning capability (Alegre and Chiva, 2013), technological capability (Zhou and Wu, 2010), total quality management (Prajogo and Sohal, 2003; 2004; Hung et al., 2010; Hung et al., 2011), quality management practices (QMP) (Kim, Kumar and Kumar, 2011), product exploitation and exploration capabilities (Molina-Castillo et al., 2011) and strategic flexibility (Zhou and Wu, 2010). Using what Alegre and Chiva (2013) suggest, the presence of strategic orientations such as EO alone is not sufficient for improved PIP, and it requires the existence of resources and the capabilities within the firm to re-orchestrate these resources to create innovative outcomes (Rosenbusch et al., 2011; 2010; Zhou and Wu, 2010).

Table 2.2

Empirical studies of product innovation across common fields of discipline

Studies	Organizational -learning/ Ambidexterity	Strategic Orientations (EO, MO and others)	Knowledge Management/ Dynamic capabilities	quality management	Cross-functional or Supply chain integration	Culture and leadership
Atuahene-Gima (1995)		◎				
Atuahene-Gima (1996)		◎				
Hurley & Hult (1998)	◎	◎				
Baker & Sinkula (1999)	◎	◎				
Lukas & Ferrell (2000)		◎				
Atuahene-Gima & Ko (2001)		◎				
Kahn (2001)					◎	
Baker & Sinkula (2002)	◎	◎				

Prajogo & Sohal (2003)				◎		
Prajogo & Sohal (2004)				◎		
Im & Workman Jr (2004)		◎				
Verhees & Meulenberg (2004)		◎				
Gloet & Terziovski (2004)			◎			
Narver et al. (2004)		◎				
Lau & Ngo (2004)						◎
Singh & Smith (2004)				◎		
Darroch (2005)			◎			
Atuahene-Gima (2005)	◎					
Luca & Atuahene-Gima (2005)					◎	
Tse, Yim & Zhou (2005)	◎	◎				
Li, Liu & Zhao (2006)		◎				
Prajogo & Sohal (2006)				◎		
Hoang, Igel & Laosirihongtong (2006)				◎		
Avlonitis & Salavou (2007)		◎				
Frishammar & Ake Horte (2007)		◎				
Luca & Atuahene-Gima (2007)			◎			
Yalcinkaya, Calantone & Griffith (2007)	◎					
Abrunhosa & Sa (2008)				◎		
Fosfuri & Tribo (2008)	◎					
Prajogo & Hong (2008)				◎		
Alegre & Chiva (2008)	◎					
Perdomo-Oritz et al. (2009)				◎		
Chen & Huang (2009)			◎			
Tellis et al. (2009)						◎
Tsai (2009)					◎	
Trivellas & Santouridis (2009)				◎		
Zhang, Di Benedetto & Hoeing (2009)			◎			
Lau, Tang & Yam (2010)					◎	
Lee et al. (2010)				◎		
Hung et al., (2010)			◎	◎		
Chiang & Hung (2010)	◎		◎			
De Visser et al. (2010)	◎		◎			
Naranjo-Valencia et al., (2010)						◎
Zhang & Duan (2010)		◎				
Zhou & Wu (2010)		◎	◎			
Al-Refaie et al. (2011)				◎		
Cousins et al. (2011)	◎		◎			
Jimenez-Jimenez & Sanz-Valle, (2011)	◎					
Lopez-Nicolas & Merono-Cerdan (2011)			◎			
Huang & Wang (2011)	◎					

Madhoushi et al. (2011)			◎			
Nasution et al. (2011)	◎	◎				
Perez-Luno et al. (2011)		◎				
Hung et al. (2011)	◎			◎		
Matias & Coelho (2011)				◎		
Molina-Castillo et al. (2011)				◎		
Zhang, Hu & Kotabe (2011)					◎	
Boso et al. (2012)		◎				
Lichtenthaler & Ernst (2012)	◎					
Bendoly et al. (2012)					◎	
Alegre, Pla-Barber & Chiva (2012)	◎		◎			
Engelen et al. (2012)					◎	
Ooi et al. (2012)				◎		
Zehir et al. (2012)				◎		
Leavengood et al. (2012)				◎		
Kim, Kumar & Kumar (2012)				◎		
Yannopoulos et al. (2012)	◎	◎				
Zhao & Lavin (2012)					◎	
Alegre & Chiva (2013)						
Calisir, Gumussoy & Guzelsoy (2013)	◎					
Perez-Arostegui, Sousa & Montes (2013)	◎			◎		
Maatoofi & Tajeddini (2013)		◎				
Augusto, et al. (2014)				◎		
He et al. (2014)					◎	
Jones & Linderman (2014)				◎		
Liu et al. (2014)		◎				
Chen et. (2014)		◎				◎

Note: Case studies and conceptual papers are excluded.

The last observation from prior studies at firm-level is that most previous research was conducted using constructs from a diverse group of management disciplines as antecedents to PIP, as shown by Table 2.2. This list focuses on studies published from 1995 to 2014 as searchable on Google Scholar and is by no means exhaustive for two reasons. First, as many studies use a variety of terms such as “new product success”, “product development” which may not exactly mean to describe product innovation outcomes. Also, this search only focused on literature pertinent to management disciplines at firm-level, so studies with PIP in fields such economics and finance were excluded. The concentration does indicate that several fields have been highly popular among researchers. *Strategic orientations* including EO and MO are highly popular (e.g. Zhou et al., 2005; Perez-Luno et al., 2011), with *organizational learning/ ambidexterity* closely following (e.g. Alegre, Pla-Barber & Chiva, 2012; Jimenez-Jimenez and Sanz-Valle, 2011). Next most popular were *dynamic capabilities* (e.g. Molina-Castillo et al., 2011), *knowledge management* (Chiang and Hung, 2010; Hung et al., 2010), and then *quality management* (e.g. Jones and Linderman, 2014), *cross-functional integration* (Bendoly, Bharadwai and Bharadwaj, 2012; Engelen, Brettel and Wiest, 2012), *supply-chain integration* (e.g. He et al., 2014; Zhao and Lavin, 2012), *culture* (e.g. Naranjo-Valencia, Sanz-Valle and Jimenez-Jimenez, 2010; Tellis, Prabhu and Chandy, 2009) and finally *leadership style* (e.g. Chen et al. 2014). PIP is also understudied with variables from fields such as *international business and strategy* (e.g. Hitt, Hoskisson and Kim, 1997) and *critical success factors* for PIP (e.g. Cooper and Kleinschmidt, 1995; Evanschitzky et al., 2012).

The pattern of this relative popularity in certain fields such as organizational learning, resource-based capabilities and strategic orientations is explainable by the importance of managing and configuring intangible resources and activities for innovation outcomes (Barney, 1991; Teece, 2007; Rosenbusch et al., 2011). High popularity of PIP research is found in innovation literature tested with constructs from related functional disciplines such as quality management (e.g. Perez-Arostegui et al. 2013) and supply chain management (e.g. Zhao and Lavin, 2012). Interest in PIP in these fields is often driven by practitioners who are stakeholders of product innovation, and there has been a growing demand for domain-specific knowledge on PIP and its antecedents. Based on the observation of this limited sample of literature and the arguments presented, fields in organizational theory such as leadership (e.g.

Chen et al. 2014) and culture (e.g. Lau and Ngo, 2004; Naranjo-Valencia et al. 2010; Verhees and Meulenberg, 2004) appear under-presented or to require more updated studies. This signals that fields in organizational studies such as "ethical climate" (e.g. Choi, Moon and Ko, 2013) and "employee involvement" (Andries and Czarnitzki, 2014) offer opportunities for future cross-discipline investigation in PIP. Future researchers of PIP may also explore areas with potential such as "green product innovation performance" (e.g. Dangelico and Pujari, 2010; Lin, Tan and Geng, 2013; Wong, 2012), "green dynamic capabilities" (Chen and Chen, 2013), as well as strategic orientations other than MO and EO such as "technology orientation" (e.g. Zhou and Wu, 2010) and "technological and innovation capabilities" (e.g. Voudouris et al., 2012; Wang, Zhou and Li-Ying, 2013; Camison and Villar-Lopez, 2014; Yam et al., 2011) and "sources of innovation" (e.g. Leiponen and Helfat, 2010; Menguc, Auh and Yannopoulos, 2014; Varis and Littunen, 2010; West and Bogers, 2013; Yam et al., 2011) in various application settings (e.g. small and medium, supply chain partnership or specific industries).

2.2.3.3 Measurement of Product Innovation Performance

Various measures of PIP have been proposed by different researchers. PIP differs from another similar construct, innovation capability, in the innovation literature, in that the latter concerns the input side only—a firm's resources and innovation efforts on new product development (Cavusgil, Calantone and Zhao, 2003). It is also noted that many studies measure product and process innovation together as innovation performance rather than just testing PIP *per se* (e.g. Jimenez-Jimenez & Sanz-Valle, 2011).

One common approach in PIP measurement adopted by authors is by including speed of development and commercialization, new product innovativeness and market success. Alegre, Lapiedra and Chiva (2006) propose that successful PIP is a second order construct with two dimensions: (1) *a firm's efficacy of exploiting new knowledge* and; (2) *the efficiency of bringing the new products to market*. Thus the measurement of a firm's PIP essentially reflects the degree of product newness and the fluency of the new product introduction process. Hung et al. (2011) operationalize the construct in terms of product development capability, commercialization speed, degree of perceived innovativeness, and customization to customers' needs. A similar approach is adopted in the studies by Baker and Sinkula (1999), Jimenez-Jimenez & Sanz-Valle (2011) and Zhang and Duan (2010).

The Oslo Manual 3rd edition published by the Organization for Economic Cooperation Development (OECD) operationalizes this measure as the sales generated by technologically new or improved products, as defined as those introduced within the last three years, per employee (OECD Oslo Manual, 2005). Atuahene-Gima, Slater and Olson (2005) use a five-item scale that measures a firm's product innovation performance in meeting revenue and profitability indicators. Kohler et al. (2012) adopts a marketing approach of measuring PIP in terms of a firm's share of new-to-market sales of technologically new products.

Prajogo and Sohal (2003) conclude that, despite variations in conceptualizing of the construct (Avlonitis et al., 1994; Hollenstein, 1996; Miller and Friesen, 1982), measures for PIP centred on the four aspects: 1) *degree of product novelty*; 2) *speed of innovation*; 3) *number of new products introduced* and; 4) *being early market pioneers*, and use this measurement in their studies of the relationship between total quality management (TQM) and innovation performance (Prajogo and Sohal, 2003, 2004 &

2006). Table 2.3 lists out some major studies with PIP and their proposed measurement of the construct.

It is notable that items developed by Prajogo and Sohal (2003) are comparable to the scale of Alegre, Lapiedra and Chiva (2006). Both measure the efficacy and efficiency of the new product innovation process, with the observable differences that the latter requires respondents to benchmark themselves against their major competitors in quantifiable matrices such as relative performance in average project costs, working hours and time. This requires the respondents to have excellent insider detailed knowledge of their competitors, which is difficult in practice even with good access to common value chain activities, and in turn affects their response strategies to the scale (Krosnick, 1991).

Table 2.3

List of studies on product innovation performance and their measurements

Studies	Operationalization of product innovation performance
Baker & Sinkula (1999)	*New Product Success (Scale)* • New product introduction rate relative to largest competitors • New product success rate relative to largest competitors • Degree of product differentiation • First to market with new applications • New product cycle time relative to competition
Prajogo & Sohal (2003 & 2004)	*Product Innovation (Scale)* • Level of newness of new products • Use latest technological innovation in new product development • Speed of new product development • Number of new products introduced to the market • Number of new products first-to-market (early entrants)
Narver, Slater & MacLachlan (2004)	*New Product Success (Scale)* • New product success compared to major competitors is good

Atuahene-Gima, Slater & Olson (2005)	*New Product Program Performance (Scale)* • Revenues, growth in revenues profitability, growth of profitability, growth of sales of new products compared with business unit objectives
Alerge, Lapiedra & Chiva (2006)	*Product Innovation Performance: (Scale)* *a) Product innovation efficacy* Compared with competitors: • Replacement of products being phased out • Extension of product range within main product field through technologically new or improved products • Extension of product range outside main product field • Development of environment friendly products • Market share evolution • Opening of market abroad and domestic *b) Product innovation efficiency* • Average innovation project development time • Average number of innovation projects working hours • Average cost per innovation project • Global satisfaction degree with innovation projects efficiency
Jimenez-Jimenez & Sanz-Valle (2011)	*Product innovation* • Number of new product intruded; • Pioneer disposition to introduce new products • Efforts to develop new products in terms of hours/person, teams and training involved
Kohler et al. (2012)	*Success of new-to-market innovations and imitations* • Share of sales achieved with products/services new-to- the-market • Share of sales achieved with products/services new-to- the-market

2.3 Entrepreneurial Orientation

2.3.1 Nature of entrepreneurial orientation

The study of entrepreneurship focuses on the creation of new businesses, as evidenced in the business new entry literature (Hackett and Dilts, 2004), and on existing organizations (Goodale et al, 2011; Sharma and Chrisman, 2007; Zahra and Covin, 1995). In the literature, researchers have focused on the latter aspect of entrepreneurship, and with a particular interest in firm-level managerial style on making entrepreneurial decisions and actions (Covin and Wales, 2012; Covin and Lumpkin, 2011). This managerial attitude, known as entrepreneurial orientation (EO), reflects the strategic postures in managers' collective mindset (Covin and Lumpkin, 2011).

The importance of an entrepreneurial attitude in firm-level strategic making was first raised by Mintzberg (1973) in his reconceptualization of strategic planning. However, it was not until Miller (1983) and the subsequent contribution of Covin and Slevin (1989) that the EO construct was developed. Further refinement by Lumpkin and Dess (1996), as a multidimensional indicator, eventually stimulated academic interest to test the EO construct (Covin, Greene and Slevin, 2006). Wales, Gupta and Mousa (2011) point out that EO should not be confused with another similar concept, corporate entrepreneurship (Zahra et al., 1995), which refers to the Intrapreneurship venturing behaviours for organizational self-renewal (Dess and Lumpkin, 2005).

The most prevalent definition of EO encompasses the three dimensions of innovativeness, risk-taking and proactiveness (Covin and Slevin, 1989; Miller, 1983). Innovativeness refers to the firm's tendency to support and commit to new concepts, practices and solutions leading to innovative outcomes (Covin and Slevin, 1989; Miller, 1983), thus an EO firm is willing to seek novel solutions to problems and favours technological innovation (Alegre, Pla-Barber & Chiva, 2012).

Risk taking measures managerial willingness to commit significant resources on opportunities even with a possibility of costly failure (Covin and Slevin, 1989; Miller, 1983), with the implication that the EO firm is willing to tolerate uncertainties of innovation endeavours. Lastly, proactiveness refers to the degree that a firm anticipates and capitalizes on prospective market needs (Covin and Slevin, 1989; Miller, 1983), thereby an EO firm has the propensity to manoeuvre ahead of the competition, and readily to employ innovative technologies or products to leverage on unmet market needs (Christensen, 1997, Yu and Hang, 2010).

Lumpkin and Dess (1996) also suggest two additional dimensions of autonomy and competitive aggressiveness. The former refers to the extent that a firm allows its members to pursue entrepreneurial opportunities without overly organizational constraints (Covin and Miller, 2014). Competitive aggressiveness measures the willingness of a firm to compete directly against its competitors' target market, with a propensity for using unconventional approaches to outperform its rivals (Lumpkin and Dess, 1996). In the product innovation context, an EO firm readily circumvents its entrenched competitors, by offering products embedded with radical or disruptive technologies (Christensen, 1997).

Generally speaking, an EO firm possesses an opportunistic posture with an intense determination to overcome external challenges for its envisioned goals and is ready to outperform and outsmart its competitors; and these characteristics are congenial to a climate for fostering product innovation performance (Alegre and Chiva, 2013; Atuahene-Gima and Ko, 2001; Miller, 1983).

2.3.2 Overview of entrepreneurial orientation prior research

Research in EO literature is broad, and this review will examine three of the more prevalent streams in the field, namely: 1) construct model; 2) the EO—firm performance models and; 3) EO—performance linkage with moderators or mediators (Covin and Lumpkin, 2011; Covin and Miller, 2014; Kreiser et al., 2013; Wales et al., 2011). These three groups of research are reviewed in the following sections.

2.3.2.1 Prior research on entrepreneurial orientation concept

This stream of research focuses on refining and development of the EO construct (Covin and Lumpkin, 2011; Covin and Wales, 2011; Covin and Miller, 2014). Within this tradition of EO research, authors differ in opinions about how the dimensions of EO can be combined (Miller, 2011). Since Lumpkin and Dess (1996) proposed two additional dimensions of 'autonomy' and 'competitive aggressiveness', in addition to the popular three-dimension version proposed by Covin and Slevin (1989), scholars have differed in their opinions about measurement of EO (Covin and Miller, 2014). There are several issues that attract academic interest.

First and most importantly, Miller (1983) and Covin and Slevin (1989) (M/CS) proposed EO as an composite construct reflected by three sub-dimensions that covary, and simultaneously manifest whenever a firm is entrepreneurial; thus each sub-dimension should influence the firm's outcomes similarly (Covin and Wales, 2012). Lumpkin and Dess, on the other hand, consider the five dimensions independently and collectively define the construct EO, and the extent to which each of these dimensions is useful for predicting the nature and success of a new undertaking may be contingent on external…or internal factors" (Lumpkin and Dess, 1996:137 cited by Covin and Wales, 2012). In short, the two definitions of EO are not competing, but referring to a different conceptualization of the phenomenon (Covin and Lumpkin, 2011; Covin and Miller, 2014). This view is further supported by some evidence that some researchers report low correlations between the components (Ferreira et al., 2012).

Second, as an elaboration of the first point, M/CS' version assumes a positive, direct and linear relationship between EO and firm performance, whereas increasingly scholars are interested in the independent role of each dimension of the construct in influencing firm performances or other dependent variables (Wales et al., 2011). As an emerging field, research focused on the curvilinear nature of EO—performance is gathering attention and support (e.g. Dai et al., 2014; Kreiser et al., 2013; Sciascia, Mazzola and Chirico, 2013; Tang and Tang, 2012; Wales et al., 2013; Zhao et al., 2011), although the unidimensional nature of EO has been assumed in most studies (Rauch et al., 2009; Wales et al., 2011). More discussions on individual EO's sub-dimensions' impact on performance are to be dealt with in the following section on reviewing "prior research on EO—performance".

Thirdly, as suggested by Lumpkin and Dess (1996) that EO's influence is a function of internal and external contexts, but the increasing globalization and entrepreneurial activities worldwide warrant the applicability of EO concepts under different national cultures (Wales et al., 2011). As shown by the review of EO literature (Wales et al., 2011), studies have been predominantly conducted in Anglophonic countries, China, continental Europe and Scandinavia with less work in less-developed countries.

Particular concerns have been raised on the lack of research in the bigger transitional economies such as Brazil, Russia, India and South Africa (Wales et al., 2011). However, the number of EO studies conducted in China ranks second only behind US output. This is partially explainable by China's rapidly growing participation in global economies that raises research interest in EO (Peng et al., 2001 cited by Wales et al., 2011). It is also partly because many such EO studies in China are conducted by Ethnic Chinese faculties teaching in American Universities (e.g. Dai et al., 2014; Tang and Tang, 2012), and thus is a reflection of American research trends. The call for more studies on EO influences in China is also legitimate, as the country's environmental contexts and national culture values are markedly different from those of the Anglo-Saxon systems (Xu and Meyer, 2013), and some EO's interactions with environmental factors may also have different effects from those reported in western studies (Tang and Hull, 2012).

While the debate on the measurement issue of EO continues (Anderson et al., 2014; Covin and Lumpkin, 2011; Covin and Miller, 2014; Covin and Wales, 2012), researchers warn that future studies should study the effect of EO with attention to specific contexts, as advised by Lumpkin and Dess (1996) (Wales et al., 2011; Wales and Covin, 2012). More discussions on the roles of moderators are presented in the coming section of "prior research on EO—performance with moderators".

2.3.2.2 Prior research on entrepreneurial orientation--performance relationship

The relationship between EO and firm performance has received considerable academic interest since the late 1990s (Covin and Miller, 2014; Rauch et al., 2009); Rauch et al. (2009) report 134 studies prior to 2007, and another 67 studies were published between 2006 and 2009 (Miller, 2011). Lumpkin and Dess (2001)

The popularity of this research stream is intuitively understandable; as conceptual arguments suggest that EO cultivates higher intensity to compete entrepreneurially, thus leading to higher firm performance (Filser and Eggers, 2014; Lechner and Gudmundsson, 2014). This widespread interest is also explainable by the intensified interest, of scholars and practitioners, to answer challenging questions in entrepreneurial decision areas such as international expansion and innovations (Dai et al., 2014; Liu et al., 2014).

Regarding the overall findings of EO—performance, Rauch et al. (2009) report that the strength of the relationship varies across studies, though a meta-analysis reveals that the effect of EO's effect on performance is regarded as positive, moderately large, significant and relevant (Rauch et al., 2009); however, there is an indication that moderators and mediators are needed to give greater explanatory power of research models, which are a reiteration of Lumpkin and Dess' original conceptualization (1996; 2001) that EO's effects cannot be determined *a priori* (Wales et al., 2011). Rauch et al. (2009) also report that the (three) dimensions are usually highly interrelated and should be combined as a composite construct despite more recent alternative views of the construct (Anderson et al., 2014). Notwithstanding the debate on the measurement issue, a substantial number of studies, even up to recently, continue to treat EO as a single factor (e.g. Alegre and Chiva, 2013; Boso, Story and Cadogan, 2013; Engelen et al., 2014; Garces-Galdeano et al., 2014; Kraus et al., 2012; Sciasica et al., 2012; Su, Xie and Li, 2011).

Another intriguing feature of EO—performance research is that some studies claim the link is nonlinear in nature. Zahra and Garvis (2000) and Bhuian, Menguc and Bell (2005) suggest that the EO—performance relationships is an inverted U-shaped one, and is supported by findings on Chinese firms (Tang et al., 2008). More recent studies also support those earlier findings in the Chinese context (Su et al., 2011; Tang and Tang, 2012). A study by Wales et al. (2013) on small Swedish firms also lends support to the curvilinear EO—performance claim. In short, these studies suggest that firms with a moderated level of EO (as a combined factor) achieve optimal performance. However this claim requires more evidence to confirm it, as admitted by the authors (Tang et al., 2008), and EO—performance is complicated as many of these studies focus on different contexts (e.g. Tang and Tang, 2012; Wales et al., 2013), thus making interpretation and comparison difficult.

Another offshoot from the EO--performance field, that overlaps with the curvilinear EO—performance claim, is the study of independent impact of the three dimensions of EO (Covin and Slevin, 1989) on firm performance. This stream of study is mostly conducted with Covin and Slevin's operationalization (1989) (e.g. Hult, Hurley and Knight, 2004). Lumpkin and Dess (2001) first study their five dimensions of EO on performance under moderation by environmental dynamism and hostility, and at four different stages of the industry life cycle (Utterback, 1994). Their findings indicate that only the proactiveness—performance link under high dynamism and high hostility was found to be significant (Lumpkin and Dess, 2001). The results also indicate that proactiveness supports performance at the first two stages of industry life cycle; though the proposed aggressiveness—performance hypotheses at the last two stages of ILC are rejected (Lumpkin and Dess, 2001). These equivocal findings also accentuate the arguments that moderators' influence on EO--performance cannot be easily determined (e.g. Jaworski and Kohli, 1993).

Some recent empirical studies respond to the call for more investigation on the relationship between EO's individual dimensions and performance (Wales et al., 2011). Generally, all three dimensions of EO (Lumpkin and Dess, 2001), are suggested to have curvilinear or U-shaped relationships with performance individually (Kreiser et al., 2013; Miller and Leiblein, 1996), indicating that each component of EO is better taken at moderate level for optimal performance (Dai et al., 2014; Kreiser et al., 2013). Studies in this genre are complex to compare and inconclusive due to the EO—performance relationship's assumed curvilinear nature and susceptibility to various contextual influences (Bedi and Vij, 2012; Rauch et al., 2009; Tang and Tang, 2012).

Despite this complication, two recent findings consensually agree on the roles of risk taking, proactiveness and innovativeness on firm performance independently (Dai et al., 2014; Kreiser et al., 2014). Both studies conclude that risk-taking varies with firm performance in an inverted U shape, suggesting excessive risk-taking is detrimental to performance even the decision makers can tolerate high risks, as explained by information asymmetry (Dai et al., 2014; Kreiser et al., 2014). Proactiveness and innovativeness are suggested to have U shaped relationships with performance, as lower levels of both preserve resources and avoid upfront obligations; while at higher levels economies of scope may be achieved, and these conditions lead to higher performance (Dai et al., 2014; Kreiser et al. 2013). Contrary to these conclusions, studies from Dada and Watson (2013) and Wang and Yen (2012) claim all three dimensions are positively related to performance. Tang and Tang (2012) also report curvilinear relationships between each EO dimension with performance, and their curvatures are alleviated by strategy types. With current evidence, more research is needed to verify the pattern and nature of individual dimensions of EO. Alternatively, some scholars argue that the unidimensional construct is a useful EO conceptualization for capturing senior level decision makers with a panoramic perspective of the firm, especially if individual dimensions are not the research interests of the study (Basso, Fayolle and Bouchard, 2009; Garces-Galdeano et al., 2014)

Regarding the performance measures, since there is no commonly agreed appropriate approach in measuring business performance, researchers resort to a wide range of measurement indicators for firm performance, including objective measures (hard data) and subjective measures (psychometric scales), as well as financial and non-financial indicators (Alegre and Chiva, 2013; Cai et al., 2014; Kreiser et al., 2013; Lechner and Gudmundsson, 2014; Van Doorn et al., 2013). Specifically, Wales et al. (2011) further report that a large number of dependent variables have been used in EO literature (see Figure 2.1), and in studies on EO—performance, the most popular measures belong to the three categories of “firm performance (various)”; “firm growth” and “firm profitability”, with *firm performance (mixed measures)*; *firm sales growth; firm (growth); firm profitability and firm return on assets* with the highest count in their reviews. A point to note from Wales et al.’s discussion (2011) is the need to include more non-business performance dependant variables, such as product innovation performance and organizational learning, as EO's impact on a firm's functioning is beyond economic efficiency and financial outcomes.

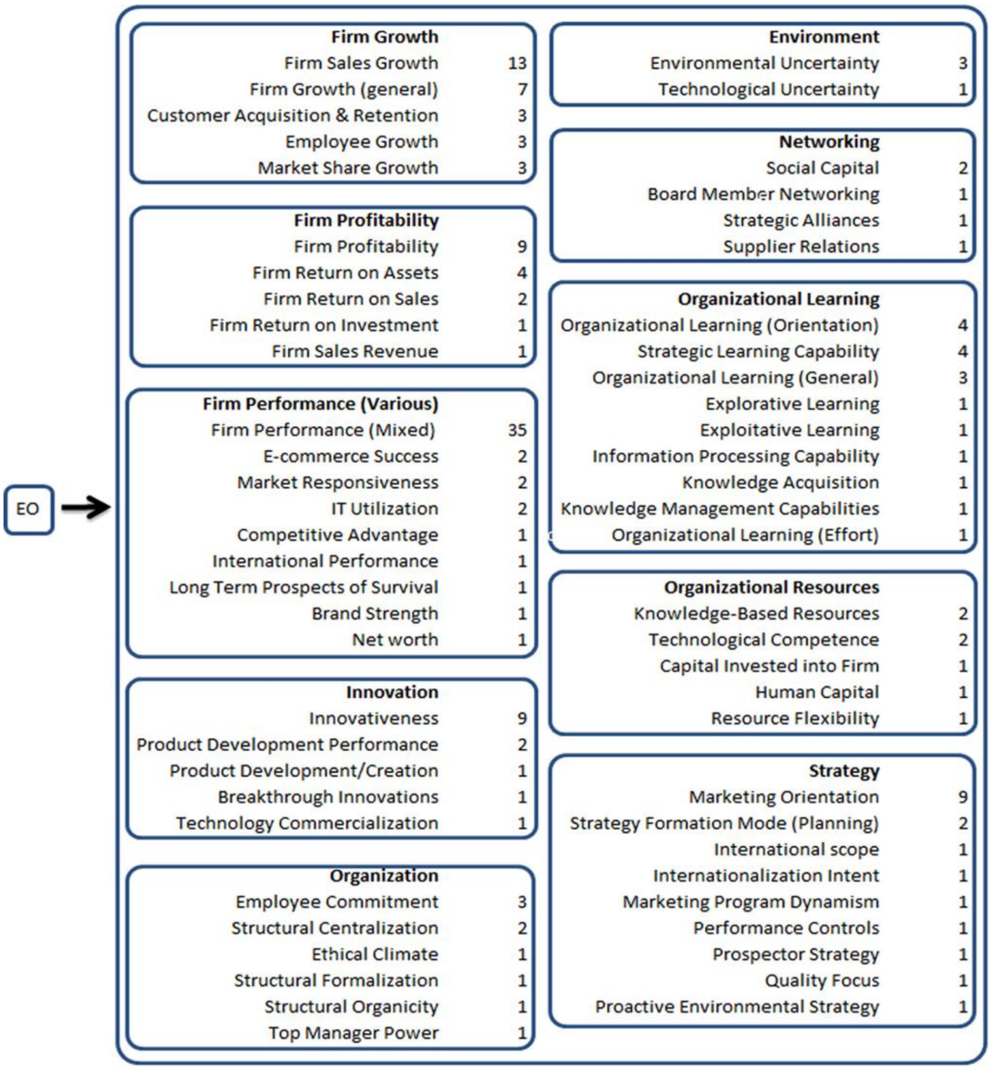

Figure 2.1 Dependent variables in prior research of entrepreneurial orientation

Source: Wales, Gupta and Mousa (2011)

2.3.2.3 Prior research on entrepreneurial orientation and performance with moderators

Besides the use of a wide range of organization performance, EO studies also test different moderators and mediators on the EO-performance relationship (Rauch et al., 2009). Despite the general findings of apositive relationship between EO and performance (Wales et al., 2011), moderators can substantially influence the relationship, and some moderating variables show moderately large correlations with firm performance (Rauch et al., 2009). High tech industries are also found to have a stronger effect on the EO-performance link than low-tech sectors (Garces-Galdeano et al., 2014), and recent studies (e.g. Saeed, Yousafzai and Engelen, 2014; Schneider and Engelen, 2014) indicate that some national cultural values have significant impact on performance contrary to earlier meta-analysis' findings (c.f. Rauch et al., 2009).

Figure 2.2 displays the common moderators as reviewed by Wales et al. (2011), and an extensive variety of moderators have been investigated. As shown in Figure 2.2, types of moderators employed in prior EO research (up to 2011) are extensive (Wales et al., 2011). The more popular moderators belong to the categories of *environmental influences; external relationships and strategy/strategic orientations;* while the relatively less studied moderators are of the classes of *organizational characteristics; CEO tenures; national culture dimensions* (as per Hofstede, 2010)*; organizational learning; human resources/employee perception of organization; leadership and team characteristics* (Wales et al., 2011).

Environmental moderators such as environmental dynamism, hostility and competition intensity (Miller and Friesen, 1983) have long been studied in strategic management (Miller, 1987, Zahra, 1996), marketing (Slater and Narver, 1994) and EO fields of literature (Covin and Slevin, 1989; Miller, 1983; Wilkund and Shepherd, 2005). The popularity of environmental moderators in EO research is intuitively straightforward, as answering how an entrepreneurial firm perceives and reacts to different environmental variations is an enduring research agenda of EO researchers (Rauch et al., 2009).

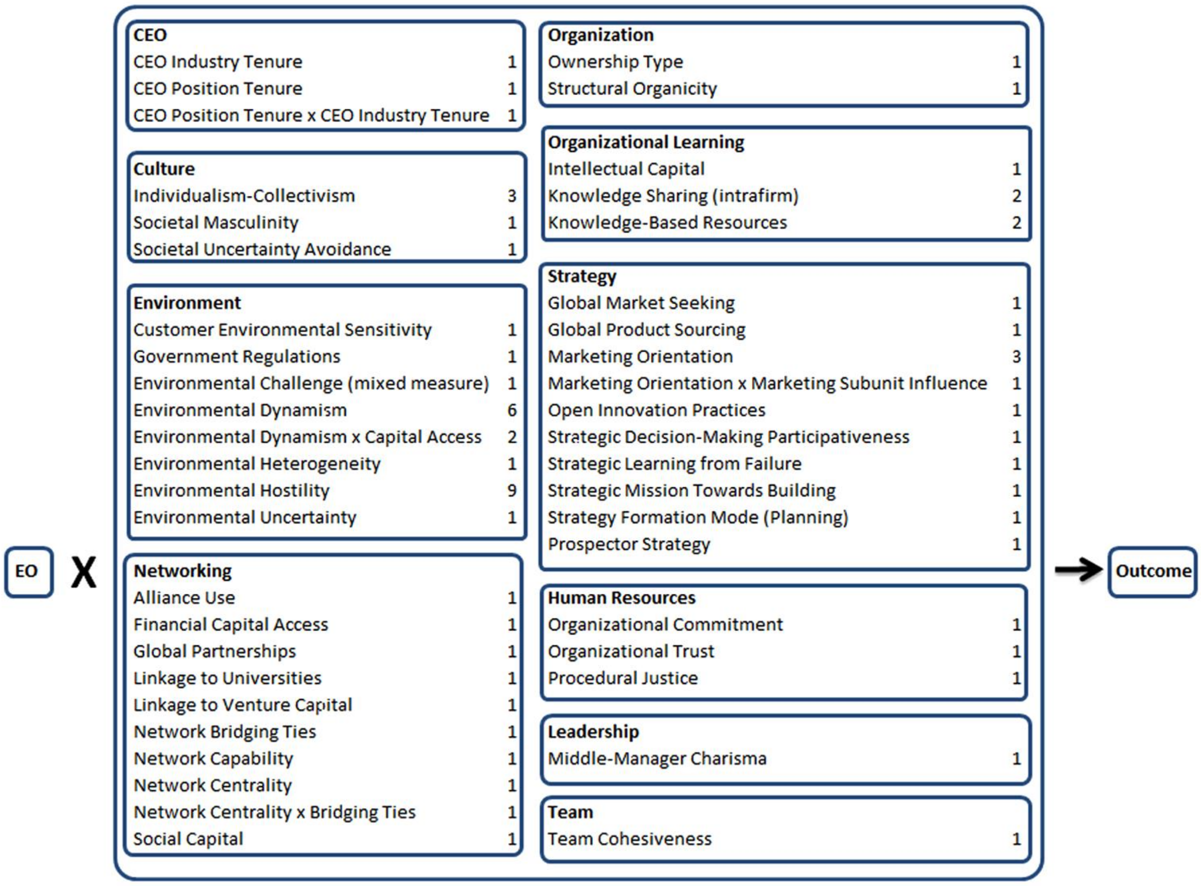

Figure 2.2 Moderating variables explored in prior studies

Source: Wales, Gupta and Mousa (2011)

Other moderators constructed from fields of *external relationships* (e.g. Boso, Story and Cadogan, 2013; Cai et al., 2014; Dada and Watson, 2013; Stam and Elfring, 2008), *strategic management* (e.g. Covin, Slevin and Green, 2006; Tang and Tang, 2012), *organizational learning* (e.g. Engelen et al., 2014), *entrepreneurship* (e.g. Anderson and Eshima, 2013), *human resource management/organizational behaviour* (e.g. De Clercq, Dimov and Thongpapanl, 2010; Engelen et al., 2012) and *marketing* (e.g. Chen, Li and Evans, 2012) are gaining popularity in more recent studies. This reflects the popularity of some research themes in the management literature such as resource-based /dynamic capabilities theories, network theories, social-exchange theories and organizational learning.

Environmental dynamism, hostility and competitive intensity are suggested as having significant positive moderating effects on EO—performance (e.g. Covin and Slevin, 1989; Kraus et al., 2012; Wilkund and Shepherd, 2005; Zahra and Garvis, 2000). While some studies report mixed results (e.g. Lumpkin and Dess, 2001; Moreno and Casillas, 2008) or that the positive moderation effect on EO—performance is contingent (Engelen et al., 2014; Su et al., 2011; Tang and Hull, 2012). In summary, environmental hostility, dynamism and competitive intensity and similar variables (such as market turbulence, environmental uncertainty) exert a strengthening influence on the EO—performance linkage in one or two moderator settings (Kraus et al., 2012); but when the linkage is subjected to multiple moderators or complicated contexts, results are less clear (Lumpkin and Dess, 2001; Moreno and Casillas, 2008).

As mentioned above, external relationship/network theory related moderators are also frequently included in research. The study by Boso et al. (2013), suggests that business and social ties intensify the EO—performance relationship in Ghanaian firms. A Chinese study reports that external technology acquisition positively moderates EO—performance of new hi-tech ventures in China (Cai et al., 2014) and thus supports Kreiser's proposition about the role of EO in organizational learning (Kreiser, 2011). Similarly, external facilitation such as franchise system support system also positively moderates EO—performance linkage (Dada and Watson; 2013). Additional evidence comes from Stam and Elfring's study (2008) which suggest that strong intra- and extra-industry social ties also strengthen the EO—performance linkage in new software ventures. Walter et al. (2006) drew supportive conclusions that inter-organizational ties strengthened the linkage. In summary, general findings indicate supportive external ties are helpful to the performance of EO firms (Stam, Arzlanian and Elfring, 2014).

In studies with strategic management-related moderators, Covin et al., (2006) examine how strategic decision-making participativeness, strategy formation mode and strategic learning from failure influence EO—sales growth. Their results indicate that all three moderators positively strengthen the relationship (Covin et al., 2006). In other words they suggest that EO, as a behavioural/decision style, requires supportive processes or structure to enhance performance (cf. Dada and Watson, 2013). Tang and Tang (2012) explore how the four Miles and Snow's (1978) strategy types affect the curvilinear relationships between the three separated dimensions of EO on venture performance in China. Their results suggest that only prospector and analyser strategies alleviate the curve with significance. Wales et al. (2013b) indicate that the EO—performance linkage is positively moderated by resource orchestration capabilities, suggesting entrepreneurial readiness and has to be complemented with capabilities for performance (Woldesenbet, Ram and Jones, 2012; Zahra et al., 2006). The reviewed findings give further indications for the need to match strategic posture, strategy and underlying strategic process (Miller, 1987; Tang and Hull, 2012).

Exploration for how organizational learning concepts overlap with EO—performance is another emerging area, though more often EO is used as a moderator instead of being a predictor (e.g. Li et al., 2009; Rosenbusch, Rauch and Bausch, 2013; Wales, et al., 2013a). Engelen et al. (2014) argue that absorptive capacity is a dynamic capability (Zahra, 2002), and their results support the argument that absorptive capacity positively moderates the EO—performance relationship. Moderators are also employed to studies of resource orchestration. Anderson and Eshima's (2013) affirmative results of the positive moderations of firm age and intangible resources on EO—firm growth in Japanese SMEs, highlight the importance of knowledge acquisition and accumulation for competitive advantage (Chirico et al., 2011; Sirmon et al., 2011; Wales et al., 2013b; Zahra et al., 2006).

Another stream of EO—performance focuses on the social exchange perspective of intra-organizational contexts. De Clercq, Dimov and Thongpapanl's study (2010) reported that procedural justice, trust and organizational commitment all positively moderate on EO—performance, and this reaffirms EO as a firm-level and collective perspective (Stam, et al., 2014; Wales, Monsen and McKelvie, 2011). The conclusions of Stam and Elfring (2008) also emphasize the importance of social exchanges within organizations, that can lead to sharing and creation of intellectual capital and social capital (De Clercq, Dimov and Thongpapanl, 2013; Li, Huang and Tsai, 2009; Wu, Chang and Chen, 2008) and thus create more opportunities for firms and leading to better performance (Cao, Simesk and Jansen, 2012; Stam et al., 2014).

Lastly, chief executive officer's (CEO) and senior management characteristics are also an emerging area of interest for EO—performance research. Engelen et al. (2012) investigate the moderating role of transformational leadership behaviours and conclude that four leadership traits positively influence the EO—performance. CEO narcissism is claimed to be a partial explanation for a heightened relationship (Wales, Patel and Lumpkin, 2013) and founder CEOs are reported as having a more positive effect on EO—firm survival, after an initial public offer, than other types of senior managers. CEO industry tenure is also found to positively moderate the EO—performance linkage, while CEO position tenure moderates negatively, thus offering an important consideration in CEO selection (Richard, Wu and Chadwick, 2009). Further evidence from Davis et al. (2010) indicates that top managers' prestige and expertise have positive impacts on the EO—performance relationship. In summary, extant literature generally supports the view that CEO personal competence and characteristics have a critical bearing on EO—performance (Engelen et al., 2012; Rauch and Frese, 2007; Richard et al., 2009), and there are suggestions that CEO identities/characteristics may be considered as one of the antecedents of EO (Miller and Le Breton-Miller, 2011; Rauch and Frese, 2007).

The central logic of adding moderators is to investigate the change to the generally positive EO—performance relationship (Rauch et al., 2009; Wales et al., 2011) under different contingencies. As mentioned above, some convergences in moderated EO—performance research are observed especially for environmental variables, social capital/ties, internal exchange, knowledge management and resource capabilities (e.g. Boso et al., 2013; De Clercq et al., 2010; Engelen et al., 2014; Tang and Tang, 2012; Wales et al., 2013a). However, the influences on EO—performance are more complicated than earlier literature suggests (Richard et al., 2009). Although moderators used in previous research are numerous and diverse, most studies only employ one or two moderators at a time, but in reality, the EO—performance relationship is under multiple influences. So studies with a single moderator may only offer partial explanations and, unless knowledge in a field has accumulated sufficiently, managers need to interpret recommendations from research with caution

(Stam et al., 2014).

2.3.3 The relationship between entrepreneurial orientation and product innovation performance

As discussed earlier dimensions of EO, such as proactiveness, risk-taking and innovativeness, are instrumental to create an organizational mindset conducive to product innovation (Hong et al., 2013; Miller, 1983; Patel et al., 2014; Perez-Luno et al., 2011). In product innovation, proactiveness is essential as it enables firms to seek unexplored market opportunities ahead of competitors (Nasution et al., 2011) in Kirznerian type innovation (Sundqvist et al., 2012). The dimension of innovativeness is also necessary for PIP as this propensity motivates firms to adopt new or even disruptive technologies, hence leading to technologically-novel products (Verhees, et al., 2010; Kreiser et al., 2013). Risk-taking is also indispensable as innovation ventures inevitably require substantial upfront resource commitment, but without any assurance of future returns (Llopis et al., 2014; Perez-Luno et al., 2011).

In spite of its intuitive connection, the number of studies of the EO—PIP relationship is relatively small though attracting attention. Since the tradition of EO emphasizes exploring the EO—firm performance linkage (Rauch et al., 2009; Wales, et al., 2011), and PIP is considered as one of the antecedents of firm performance (Alegre et al., 2012; Avlonitis and Salavou, 2007; Hogan and Coote, 2014; Kostopoulos et al., 2011; Patel et al., 2014), new research effort on this relationship is warranted (e.g. Atuahene-Gima and Ko, 2001; Boso, Cadogan and Story, 2012; Hong, et al., 2013; Madhoushi et al., 2011).

Among the EO-PIP studies, some of them examine the effect of EO and market orientation (MO) as independent predictors of PIP (Atuahene-Gima and Ko, 2001; Frishammar and Ake Horte, 2007; Hong et al., 2013; Zhou et al., 2005). Atuahene-Gima and Ko (2001) conclude that firms with high EO and MO are complementary, and together they result in the highest overall new PIP. High EO firms only perform better under turbulent environments (Atuahene-Gima and Ko, 2001). Their results suggesting a diminished role of EO on PIP differs from other scholars' conclusions (c.f. Hamel and Prahalad, 1994). The results of Li, Liu and Zhao (2006) confirm that EO has a direct positive impact on new product success and similar results are reported in other studies (Patel et al., 2014; Perez-Luno et al., 2011; Zortea-Johnston, Darroch and Matear, 2012).

More recent studies of the EO—PIP linkage provide more evidence on the relationship. Perez-Luno et al. (2011) report similar results to Frishammar and Ake Horte (2007), which under the moderation of environmental dynamism, suggesting that the linkage is performing better rapid environmental changes. Madhoushi et al. (2011) also report in their study of EO's positive impact on innovation performance, with knowledge management as a mediator, an indication that EO leads to better utilization of knowledge assets. Two wave survey research (Patel et al., 2014) indicates that EO has a direct positive impact on innovation performance (patents), which leads to sales growth under positive moderation of potential and realized absorptive capacities. Supportive evidence for EO's direct impact on PIP is found in similar studies (Boso, Cadogan and Story, 2012; Zortea-Johnston et al., 2012). Given that the roles of proactiveness, innovativeness and risk-taking in a composite EO are all conceptually consistent to innovation tendency, these EO—PIP results are expected.

Hong et al. (2013) suggest that EO and MO have complementary roles in determining new product success in Korean firms (Atuahene-Gima and Li, 2001), with EO having a strong influence on product novelty and intellectual property management process. Their results agree with the investigation outcomes by Boso et al. (2012), which suggest that with increasing dynamic export market conditions, EO and MO behaviours drive export PIP together. Summarizing the literature of EO and PIP, many of these studies suggest that EO is a major direct factor leading to enhanced PIP (Boso et al., 2012; Hong et al., 2012; Zhou et al., 2005).

An interesting study by Martin-de Castro et al. (2014) also highlights the positive moderating role of innovation culture on the relationship between knowledge assets and PIP, suggesting that firm-level innovativeness facilitates the application of organizational knowledge for innovation outcomes. This result is consistent with Wong (2014), who concludes that though all three EO dimensions drive PIP, environmental turbulence moderates both innovativeness and proactiveness with PIP, the effect is more pronounced for proactiveness. Increasingly, scholars are more interested in identifying individual dimensions' roles in influencing PIP, especially in different contexts (e.g. Spanjol, Muhlmeier and Tomczak, 2012; Wong, 2014). Martinez-Roman and Romero's research (2013) also shows that proactiveness and risk-taking are prominent in bringing radical innovations, but not incremental innovation. Verhees et al. (2010) report that innovativeness directly influences performance expectations of small firms considering radical innovation. In summary, this decompositional approach to the EO—PIP relationship is highly contextually-dependent and may vary across sectors and national cultures (Schneider and Engelen, 2014), and more evidence is needed for better understanding of EO's internal structure in relation to PIP (Martinez-Roman and Romero, 2013; Spanjol et al., 2012).

Further evidence also points to the benefit of adding a resource or capability. Results from Patel et al., (2014) are important as the authors suggest that EO is strengthened by absorptive capacities (see also Engelen et al., 2014; Sciascia et al., 2014; Wales et al., 2013). This indicates that EO can be complemented or strengthened with a learning capability (Storey and Hughes, 2013) which in turn fosters dynamic capability (Hung et al., 2010). The role of unabsorbed slack (Nohria and Gulati, 1996) is suggested by Liu et al. (2014) to contribute to PIP and is positively moderated by EO. Additional insight can be gained from Li et al. (2010) on the moderating effects of strategic flexibility (which comprises resource flexibility and coordination flexibility) (Nadkarni and Nareyanan, 2007; Sanchez, 1997) on PIP and financial performance. Li et al. (2014) claim only coordination flexibility has a positive impact on the PIP—performance route. These findings in some ways integrate the findings of Liu et al. (2014) and Patel et al. (2014), that intangible and knowledge resource bases play a larger role in the EO—PIP linkage, while resources reconfiguration capability has a more important impact on the EO—performance relationship (Li et al., 2010).

In sum, EO encourages an internal atmosphere of explorative innovation and experimentation of new ideas which eventually facilitates new product development (NPD) (Drucker, 1985; Lumpkin and Dess, 1996, 1997; Li, Liu & Zhao, 2006). Since explorative innovation involves risk tolerance and commitment of resources to NPD projects that do not have immediate financial rewards (Atuahene-Gima and Murray, 2007; Zahra, Ireland & Hitt, 2000), firms that are high in entrepreneurial orientation have a higher success rate of product innovation performance. Hence, it is suggest here that:

Hypothesis 1: A firms' level of entrepreneurial orientation has a positive and significant relationship with its product innovation performance.

Summarizing the abovementioned findings, while EO is a powerful driving factor for PIP, the manifestation of entrepreneurial propensity requires more than readiness; a complementary strategic orientation especially a market-driven one (Boso et al., 2012) or an organizational capability must also be in place for optimal PIP (Hung et al. 2010; Liu et al., 2014; Patel et al., 2014). This is not surprising as EO is supposedly a firm-level propensity in response to environment (Miller, 1983; Covin and Slevin, 1989); thus some forms of organizational capability (Hung, Lien and McLean, 2009; Hung et al., 2010) and knowledge-based resources (Wilkund and Shepherd, 2005; Zhou and Li, 2012) are needed as a means to convert entrepreneurial mindset to successful innovation outcomes (Martin-de Castro et al., 2013). As an extension of these assumptions, an EO firm with internal processes aligned to knowledge creation and resources application therefore has a higher chance of achieving superior PIP (De Clercq et al., 2010; Lisboa, Skarmeas and Lages, 2011; Siegel and Renko, 2012; Wang, Su and Yang, 2011), and one of such an integrated processes platform is quality management (Anand et al., 2009; Asif, de Vries and Ahmad, 2013; Choo, Linderman and Schroeder, 2007; Hung et al., 2010; Hung et al., 2011; Ooi et al., 2012).

2.4 Quality Management

2.4.1 Central concept of quality management

Quality management (QM) is a management philosophy and an integrated set of management practices and techniques (Powell, 1995; Sitkin, Sutcliffe and Schroeder, 1994); it is built on the tenets of customer satisfaction, continuous improvement and teamwork (Dean and Bowen, 1994). The central concept of QM is to ensure that the products and services, as well as the processes that produce the outputs, are consistently performing against standards, which in turn reflect customers' needs and expectations (Juran and de Feo, 2010). Also, organizations under QM need to adopt the practice and culture of continuously improving the organization's processes, products and services for perfection---always from the perspective of the customers (Imai, 1986). To make QM work, organizations are urged to adopt a new culture that emphasizes quality-consciousness, cooperation and teamwork (Deming, 1986), together with the proficient use of quality/industrial engineering techniques for rooting out process and output problems (Roos, Womack and Jones, 1991).

2.4.2 The origin and evolution of quality management

The modern concept that 'quality is manageable' first appeared in Shewhart's seminal work on statistical process control (SPC) (Shewhart, 1931), which was later expanded, refined and propagated by quality management's American founding fathers into principles and techniques (Crosby, 1979; Deming, 1986; Juran and Gryna, 1993). Deming and others brought their teachings to post WWII Japan, and received wide acceptance (Deming, 1986). QM was re-imported from Japan to the US (Imai, 1986, 2010, 2012) following the great success of Japanese products in the 1980s (Deming, 1986). Even though QM has American roots, it was the Japanese that refined QM principles, practices and techniques for widespread application (Martinez-Lorente, Dewhurst and Dale, 1998). Commentators suggest that QM enjoyed greater initial acceptance and awareness in Japan because QM's principles resonate with the Japanese tradition of perfectionistic craftsmanship (Imai, 1986, 2010; Noronha, 2002). When QM was widely adopted in the US in the 1990s advanced practitioners, such as Motorola and General Electric, elaborated the implementation and practices of QM into an American equivalent, Six Sigma (Tjahjono, 2010). Another evolutionary route of QM, since the 1990s, is the emergence of business excellence models, such as the European Foundation of Quality Management (EFQM) and the US Malcolm Baldrige National Quality Award (MBNQA), which emphasize a wider scope of applications in private and public sectors (Talwar, 2011).

2.4.3 Practices of quality management

The definitive structure of the QM construct was subjected to numerous studies in the 1990s, when scholars attempted to operationalize its dimensions (e.g. Ahire, Golhar and Waller, 1996; Black and Porter, 1996; Flynn, Schroeder and Sakakibara, 1994; Rao, Solis and Raghunathan, 1999; Samson and Terziovski, 1999; Saraph, Benson and Schroeder, 1989). Today, the components and nature of QM are largely agreed by researchers and practitioners, and codified in the form of standards (ISO 9000 series) and 'excellence model' criteria (Talwar, 2011).

Specifically, scholars (e.g. Black and Porter, 1996; Dean and Bowen, 1994) suggest that the adoption of QM generally requires the practices of:

(1) *Visionary leadership*: leaders need to establish common purpose and future direction of the organization, and be responsible for creating an internal atmosphere conducive to change to a quality culture. Leaders are also expected to strongly commit to the QM cause and be a role model (Juran and Defeo, 2010).

(2) *Strategic planning*: the QM organization adopts a formal approaching in planning the future and competitive position, and managers are involved in this formal process and continuously adjust strategy according to feedback (NIST/MBNQA program, 2014; Talwar, 2011).

(3) *Customer focus and satisfaction*: the QM organization proactively and

systematically understands and responds to customers' existing and latent needs, with a formal customer satisfaction measurement monitoring and responding system (Oakland, 2014; Talwar, 2011).

(4) *Process management*: the QM firm ensures its processes are stable, predictable, efficient and capable of delivering the products and services that customers really desire. Techniques such as statistical process control, 5S housekeeping and quality function deployment are commonly used. (Oakland, 2014).

(5) *Information analysis for decision making*: managers always make decisions based on the results of data analysis and timely information, and not personal judgement or preference. A formal information system exists to support QM firm managers for understanding, discussing and making decisions at all stages (NIST/MBNQA program, 2014; Talwar, 2011).

(6) *Systematic approach to management*: QM firm managers understand that quality objectives are achievable only when all interrelated processes are managed and improved, rather than local maximization (Deming, 1986).

(7) *Human resource management*: the QM firm's human resource practices emphasize the motivation and the development of employees for their achievement of individual and collective quality goals, and foster a culture of cooperation and teamwork (Deming, 1986; Prajogo and Cooper, 2006).

(8) *Partnership with suppliers and customers*: suppliers and customers are seen as mutually beneficial and inter-dependent long-term partners of the QM firm, and quality improvement or assurance initiatives are often coordinated and implemented among partners (Juran and Defoe, 2010).

Table 2.1 is a summary of the practices/dimensions within the integrative construct of quality management practices (QMP) as defined by the Malcolm Baldrige National

Quality Award, the measurement of QM most widely accepted among practitioners and used in QM studies (NIST/MBNQA program, 2014; Prajogo and Sohal, 2006).

2.4.4 The 'hard' and 'soft' duality of quality management

As shown by its major components, QM is peculiar in its dual nature, for it has mechanistic or 'hard' characteristics as well as organic or 'soft' elements (Calvo-Mora et al., 2013; Rahman, 2005). It is understandable as QM concepts were developed by pioneers under the influence of different management thoughts in the first half of the 20th century (Spencer 1994). QM holds a statistical-mechanistic view of business systems and process variation reductions (Deming, 1986). However, it also emphasizes the importance of the human dimension of work and advocates for effective leadership, teamwork, employee involvement and development (Anderson, Rungtusanatham and Schroeder, 1994; Deming, 1986; Sitkin, Sutcliffe and Schroder, 1994). As researchers point out, QM principles overlap with diverse management paradigms (Spencer, 1994), such as scientific management (Taylor, 1911), organizational learning (Argyris and Schon, 1974; March, 1991), system theory (Ashmos and Huber, 1987; Kast and Rosenzweig, 1972).

Table 2.4

Dimensions/practices of the quality management practices (QMP) construct

Practices/ dimensions[1]	Scope [2]	Nature[3]
Leadership	• Create shared purpose • Foster culture of quality and innovation • Encourage members to participate change • Remove departmental barriers	Soft/organic
Strategic Planning	• Mission communicated among members • Systematic planning system in place • Plans and objectives including stakeholders' concerns • Written statement of strategy and supported by senior management team	Hard/mechanistic
Customer Focus	• Actively seek and understand customers expectations • Customers' needs are disseminated and well understood by members • Stay close to customers with easy feedback channels • Effective customer service and satisfaction measurement systems	Hard/mechanistic
Information and Analysis	• Comprehensive organization-wise performance measurement system • Updated data and information for decision support for members • Senior management regularly use performance reviews for decisions • Active benchmarking with competitors and best practice	Hard/mechanistic
People Management	• Organization-wise training and development system in place • Effective top-down and bottom-up feedback • Employee satisfaction formally assessed and act upon • Training emphasizes multi-tasking and flexibility of employees • Health, employee well-being and safety	Soft/organic
Process Management	• Internal customers are respected • Processes are designed to be failsafe • Clear, standardized and documented instructions • Extensively use statistical techniques to improve processes • Long-term partnership with suppliers • Regular supplier assessment system	Hard/mechanistic

Sources: 1. Malcolm Baldrige National Quality Award, 2014;
2. Prajogo and Sohal (2006); 3. Calvo-Mora et al. (2013)

Spencer (1994) explains that this hybrid nature of QM is partly the result of building organistic/humanistic elements on top of Shewhart's original mechanistic/process view of organizations, at the time (1930s and 40s) when the human relations movement was in vogue (Bruce and Nylan, 2011, Hackman and Wageman, 1995; Mayo, 1930). The eclectic characteristics of QM reflects the trend of organizations models and evolution of management theories (Guillen, 1994; Hackman and Wageman, 1995) as well as QM's tenacity and flexible in morphing itself for contemporary business logic (Schroeder et al., 2008).

2.4.5 Distinction between quality management, total quality management and six sigma

QM has been evolving into different formats, and one of most well known and earliest forms is total quality management (TQM). TQM is a term first coined by American practitioners to describe the Japanese way of quality management practices (QMP) and their generic implementation philosophy, with the intention to emphasize the holistic and integrative nature of these imported initiatives in the 1980s (Andersson, Eriksson and Torstensson, 2006). The global diffusion of TQM adoption gathered momentum in the 1980s and reached its peak around the mid-1990s (Ehigie and McAndrew, 2005). Though QMP are still widely implemented, the term 'TQM" has become less frequently used by academia outside its discipline circle. Rather, generic terms such as 'quality management' or 'quality management practices' are more frequently referred to, probably for the reason of distancing the perceived 'faddish' movement image in the 1980s and 90s (Andersson et al., 2005). Also, QMP is the term adopted by international standards (e.g. ISO 9001) and business excellence models for its conceptual purity and neutrality (Ehigie and McAndrew, 2005). For this reason recent mainstream research and this study adopt the terminology of QMP (e.g. Kim, Kumar and Kumar, 2012), as the term reflects the whole set of practices that should be found in a properly implemented QM context.

Another example is the evolution of QM into Six Sigma, reflecting the increasing needs for tighter control and coordination, shortening product development cycles and organizational learning in the early 21st century (Anand, Ward and Tatikonda, 2010; Schroeder et al., 2008). Six sigma originated at Motorola in 1986 and was popularized by General Electric's highly successful implementation since the mid-1990s (Evans and Lindsay, 2014). Six sigma is a significant extension from QM as, on top of the QMP found in any conventional QM system, this methodology prescribes a highly structured stage-by-stage implementation approach, akin to project management; at each stage specific actions, outcomes and analytical tools are clearly indicated (Evans and Lindsay, 2014).

Six sigma execution is usually conducted in five stages, namely DMAIC or "Define-Measure-Analysis-Improve-Control" (Evans and Lindsay, 2014). At the "Define" stage, quality problems and customer expectations are clearly defined, goals are set and project scope and timeline are established (Goetsch and Davis, 2012). In the "Measure" stage, performance metric baselines for the problem are measured and performance gaps are identified, following with "Analyse" which identifies the root causes and prioritizes their resolution (Goetsch and Davis, 2012). The last two phases of the DMAIC cycle are "Improve" which requires creative generation of solutions for the problem and develops an implementation plan for actions, and "Control" which involves monitoring of the implemented solutions, fine-tuning and updating documentation and training (Evans and Lindsay, 2014). DMAIC can be regarded as comparable to the older PDCA (Plan-Do-Check-Act) quality improvement cycle, where the "Plan" phase is similar to the 'Define" phase of DMAIC, and the "Do" phase resembles "M", "A" and "I" phases of the six sigma cycle, while "Check" and "Act" are represented by the "Control" phase (Goetsch and Davis, 2012; Oakland, 2014).

Besides implementation their approach (generic vs. design), the other aspect that distinguishes QM and Six Sigma is their relative scope (Chiarini, 2013). Six sigma has evolved and integrated with lean production and becomes lean six sigma, as well as reaching to "white-collar" domains such as business processes in financial services, R&D, healthcare and other functional areas (Chiarini, 2013; Pepper and Spedding, 2010). Despite the popularity of six sigma and its claims of many benefits such as product innovation (de Souza et al., 2013), evidence from the practising company 3M suggests that its impacts on PIP are contextual and more complex than proponents claim (Canato, Ravasi and Phillips, 2013; Garud, Gehman and Kumaraswamy, 2011). More research is needed to clarify in what way six-sigma contributes to product innovation.

2.4.6 Prior research in quality management

2.4.6.1 Overview of quality measurement research

Research in QM accelerated in the 1990s despite its debut in the West in the 1980s (Ahire, Landeros and Golhar, 1995; Sila and Ebrahimpour, 2002). As an originally practitioner-driven methodology undergoing evolution, QM was not precisely understood due to the overlapping yet distinctive teachings of various pioneering 'gurus' such as Deming, Juran and others (Martinez-Lorente, Dewhurst and Dale, 1998). Early research effort focused on QM's operationalization and measurement. Table 2.6 shows some of the studies on QM definition and operationalization, and a consensus of QM's components and measurement had been commonly agreed by the end of 1990s.

As observed from the examples of QM measurement in Table 2.5, the scales agree with each other in dimensions and differ only in scope. However, as Singh and Smith (2006) point out QM measurements were commonly developed from three approaches. Earlier measurements (e.g. Saraph et al. (1989), Flynn et al. (1994) and Ahire et al. (1996)) adopted an elemental approach, or deconstructing QM based on the practical advice for good QM practices found in the quality literature (Singh and Smith, 2006).

Another approach was to align the inventory constructs with the award/prize criteria. The versions by Black and Porter (1996), and Rao et al. (1999) were developed on Baldrige model criteria, which covers the widest scope (Singh and Smith, 2006). The third approach was to base the dimensions on ISO 9000: 2000 standard requirements, or a hybird with the prior two QM definitions such as those developed by Zhang et al. (2000) and Singh and Smith (2006). Table 2.6 summarizes the different in emphasis across the three approaches (Singh and Smith, 2006).

Table 2.5

A sample of studies on quality management construct measurement and definition

Year	Researchers	Major findings
1989	Saraph, Benson & Schroeder	8 critical areas of quality management practices (QMP) are synthesized and proposed: • Role of management leadership and quality policy • Role of the quality department • Training • Product-service design • Supplier quality management • Process management • Quality data and reporting • Employees relations
1994	Flynn, Schroeder & Sakakibara	An inventory of 14 scales covering the 7 dimensions of QMP was developed. The seven dimensions are: • Top management support • Quality information • Process management • Product design • Workforce management • Supplier involvement • Customer involvement
1996	Ahire, Golhar & Walker	An instrument of 12 constructs was developed: • Top management commitment • Supplier quality management • Supplier performance • Customer focus • SPC usage • Benchmarking • Internal quality information usage • Employee involvement • Employee training • Design quality management • Employee empowerment • Product quality
1996	Black & Porter	An instrument is developed from the criteria of Malcolm Baldrige Quality Award model and 10 critical factors of QM was identified. The 10 factors: • People and customer management • Supplier partnerships • Communication of improvement information • Customer satisfaction orientation • External interface management • Strategic quality management • Teamwork structures for improvement • Operational quality planning • Quality improvement measurement systems • Corporate quality culture

1999	Rao, Solis & Raghunathan	A instrument developed from data collection from 5 countries: US, India, China, Mexico and Taiwan, with 13 dimensions: • Strategic quality planning • Quality information availability • Quality information usage • Employee training • Employee involvement • Product/process design • Supplier quality • Customer orientation • Quality citizenship • Benchmarking • Internal quality results • External quality results
2000	Zhang, Waszink & Wijingaard	An instrument of 11 constructs was developed from 212 Chinese manufacturing firms. The constructs are: • Leadership • Supplier quality management • Vision and plan statement • Evaluation • Process control and improvement • Product design • Quality system improvement • Employee participation • Recognition and reward • Education and training • Customer focus
2006	Singh & Smith	An instrument of 13 constructs was developed from data collected from 418 firms. The constructs are: • Top management leadership • Customers • Employees • Suppliers • Information and communication systems • Processes • Wider community • Competitors • Business conditions • Product quality • Customer satisfaction • Business performance • Community relations
2012	Wang, Chen & Chen	An instrument of 7 constructs and 28 items were adopted from Grandzol and Gershon (1998) for the use of in a survey for 558 Taiwanese hotels. The constructs are: • Customer focus • Internal/external cooperation • Continuous improvement • Leadership • Employee fulfilment • Learning • Process management

As per Table 2.5, most operationalizations for QMP cover leadership (e.g. Ahire et al., 1996; Singh and Smith, 2006; Wang et. al., 2012; Zhang et al., 2000), and this is in agreement with the teaching of the founding fathers of QM that top management support is critical to QM implementation (Deming, 1986; Juran and Defeo, 2010).

Most measurements also include design practices to ensure product quality (e.g. Flynn et al., 1994; Rao et al., 1999; Singh and Smith, 2006; Zhang et al., 2000), and this reflects the dual importance of both product and process quality in a properly run QM initiative (Goetsch and Davis, 2012), which is in contrast to ISO 9001 and quality awards measurement frameworks which emphasize on process quality (Oakland, 2014).

A few researchers also include the less common dimension of corporate social responsibility (e.g. “quality citizen” in Rao et al. (1999) and “wider community”, “community relations” in Singh and Smith, (2006)), which is a broader definition of serving external customers (Deming, 1986). The measurements of Singh and Smith (2006) and Rao et al. (1999) are also exceptional in that they incorporate “business performance”, “internal/external quality results” and thus resemble the input-output assessment approach used in most business excellence/quality award models (Goetsch and Davis, 2012), rather than just measuring quality input practices in other measurements (e.g. Black and Porter, 1996; Wang et al. 2012).

Other than these differences, all measurements include major social-technical practices of QM, such as the “soft/organic” (people-oriented) practices of employee involvement and development, training and development, supplier partnership and customer focus (Calvo-Mora et al., 2013; Hietschold, Reinhardt and Gurtner, 2014), as well as “hard/mechanistic” practices of continuous improvement, process management, quality data and information analysis for decisions (Calvo-Mora et al., 2013; Oakland, 2014).

Table 2.6

Comparison of constructs of quality management as defined by standard-based, prize criteria-based and elemental based approaches.

Construct	Standard-based	Prize/award criteria-based	Elemental
Top management leadership	◎	◎	◎
Customers	◎	◎	◎
Employees	◎	◎	◎
Suppliers	◎	◎	◎
Information & communication systems	◎	◎	◎
Processes	◎	◎	◎
Wider community	N.A.	◎	N.A.
Competitors	N.A.	N.A.	◎
Business conditions	N.A.	◎	N.A.
Product quality	◎	◎	N.A.
Customer satisfaction	◎	◎	N.A.
Business performance	N.A.	◎	N.A.
Community relations	N.A.	N.A.	N.A.

Source: Singh and Smith (2006)

In brief, despite the difference in scope and coverage in QM operationalization as shown in past studies, the core QM conceptualization has gained agreement among researchers as the subject's definition issues are "more or less resolved" (Nair, 2006, p 949; Hietschold, 2014). Hackman and Wageman (1996) point out that there is strong evidence supportive to QM's convergent and discriminant validity in its elemental form (Nair, 2006), as well as its other derivative forms (Singh and Smith, 2006). It merits the shift of research attention to other aspects of QM, though an incremental theory development of the QM construct is needed as a living discipline (Sousa and Voss, 2002).

2.4.6.2 Quality and firm performance research

Quality pioneers stipulated that the adoption of QM leads to better operational and business performance of firms (Deming, 1986; Juran and Defoe, 2010), however little empirical support was available before the 1990s (Sila and Ebrahimpour, 2002).

Another dominant theme of research in the QM field is the study of relationships between QM and firm-level business or operational performance, and most conclude with a positive relationship between the two variables (Dow, Samson and Ford, 1999; Easton and Jarrell, 1998; Hendricks and Singhal, 2001; Kaynak, 2003; Kaynak and Hartley, 2005; Lakhal, Pasin and Limam, 2006; Lemak, Reed and Satish, 1997; Powell, 1995; Reed and Lemak, 2000; Samson and Terziovski, 1999; Santos-Vijande and Alvarez-Gonzalez, 2007; Zakuan et al., 2010).

The findings in this field of study generally agree that QM plays an important role in improving firm effectiveness and raising business performance to world class excellence level, albeit its early faddish appearance (Ahmad et al., 2013; Hackman and Wageman, 1996; Nair, 2006). In some QM studies, different performance metrics such as financial performance (e.g. Hendricks and Singhal, 1997; Powell, 1995), operational performance (e.g. Flynn et al., 1995; Kaynak, 2003; Samson and Terziovski, 1999a & b; Yeung, Cheng and Lai, 2006), and occasionally customer satisfaction (e.g. Anderson et al., 1995; Rungtusanatham et al., 1998) were chosen to measure performance (Nair, 2006). In a meta-analysis of 29 papers, published between 1995 and 2005, QM was found to have significant correlation to firm-level *aggregated* business performance (Nair, 2006). Another interesting finding in meta-analysis, by Ahmed et al. (2013), on 20 QM studies (from 2003 to 2012) indicates that the QM-aggregated performance relationship appears to be contingent on the geographical region of the firm, and the impact of QM on firm-level business performance is most pronounced in Asian developing countries (Ahmad et al., 2013).

The latter's discovery is consistent with Nair's (2006) observation that there exist complex contextual influences on the generally positive direct QM and performance linkage. However, as Ahmad et al., (2013) comment, a relatively small number of extant studies investigate the role of contextual variables in moderating the effectiveness of QM on performance (Reed, Lemak and Montgomery 1996; Sousa and Voss, 2001). Based on Nair's (2006) analysis of previous findings, they conclude that:

1) moderators exist and influence the relationship between QM and aggregated performance;
2) individual QM practices relate differently to financial performance, operational performance, customer satisfaction and the aggregated performance and;
3) Interactions and interrelationships exist among and between the different measures of (financial, operational and aggregated) performance (Sousa and Voss, 2002).

For the last point, Sousa and Voss (2002) stipulate it as the cause for the lack of evidence for a significant relationship between individual QM practices and performance (e.g. Powell, 1995), as QM practices interact together to exhibit its impact on performance (Nair, 2006). The last two findings resonate with the results of Prajogo and Sohal's (2004) study, which argues that the organic or explorative QM model co-exists with mechanistic or exploitation QM models and, under a quality-conscious culture, explorative QM practices are more associated with operational performance (Wu, Zhang and Schroeder, 2012; Wu and Zhang, 2013). This conclusion is in contradiction to the findings of Wiengarten, Fynes and Cheng's study (2013), which reports that a culture of innovativeness strengthens the relationship between QM practices and operational performance. In brief, despite some findings indicating that QMP intensity is related to a wide variety of metrics in operational performance such as PIP, product development time, customer and employee satisfaction, operational costs, product/service quality results and manufacturing productivity (Anh and Matsui, 2011; Baird, Hu and Reeve, 2011; Mohrman et al., 1995; Prajogo and Hong, 2008; Sadikoglu and Olcay, 2014; Samson and Terziovski, 1999), overall strength of impact of QMP on overall operational performance metrics is mixed (Ebrahimi and Sadeghi, 2013), particularly when contextual variables come into play (Canato et al., 2013; Ebrahimi and Sadeghi, 2013; Jayaram, Ahire and Dreyfus, 2010; Sadikoglu and Olcay, 2014).

In conclusion, as Prajogo and Sohal (2004) suggest, QM is a multidimensional construct, and its mechanistic practise (Table 2.1) such as strategic planning, customer focus, process management, and information analysis are more associated with exploitative operational performance (Anderson, et al., 1994; Calvo-Mora et al., 2013). On the other hand, organic or explorative practices (Table 2.1), such as people management and leadership are more associated with explorative or innovative performance (Prajogo and Sohal, 2004; Wu, Zhang and Schroeder, 2012), though more research is needed to clarify the linkage between QM implementation orientation and roles of individual practices. There are differences in opinions on how contextual factors, such as organizational culture (e.g. Benson, Saraph and Schroeder, 1991; Sousa and Voss, 2001; Wiengarten et al., 2013), external environment and strategy (Prajogo and Sohal, 2001), moderate the QM-performance relationships, and indicate that more empirical evidence is required to answer this issue (Zhang, Linderman and Schroeder, 2012).

2.4.7 Quality Management and Product Innovation performance

The relationship between QM and product innovation performance (PIP) is inconclusive and scholars differ in their opinions about the nature of this linkage. This QMP—PIP relationship belongs to the broader field of QM and innovation performance literature, which is known to be a complex subject. Some suggest that this is attributable to the multidimensional nature of the QMP construct—certain component practices promote exploration while others facilitate exploitation (Luzon and Pasola, 2011; Prajogo and Sohal, 2001, 2004; Sadikoglu and Olcay, 2014). Also, innovation has multiple typologies and definitions. So how "QMP affects innovation" has become a loosely defined question, and all these complexities render findings in this field mixed and inconsistent. (Keupp, Palmie and Gassmann, 2011; Lopez-Mielgo, Montes-Peon and Vazquez-Ordas, 2009; Singh and Bernstein, 2006).

Studies on the QM and innovation relationship are categorized into three streams of interest and the positive and negative views of these findings are discussed (Raja and Wei, 2014):

1) Studies focus on the impact of QM on organizational innovation performance (i.e. process and product innovation performance) (e.g. Arostegui, Sousa and Montes, 2013; Zeng, Phan and Matusi, 2014);
2) Studies investigating impact of specific individual QM practices on organizational or specific innovation performance (e.g. Lau, Yam and Tang, 2007);
3) Studies examining impact of QM on specific forms of innovation (either product or process quality) (e.g. Ooi, Tee and Chong, 2009; Prajogo and Hong, 2008; Sadikoglu and Zehir, 2010).

2.4.7.1 Theoretical arguments supporting quality management—product innovation relationship

The theoretical foundation for the QM—innovation linkage is built on the two distinctive concepts of organizational learning, as it is argued that QM practices or QMP as a holistic package, consists of mechanistic practices (see Table 2.1) that promote maximizing efficiency from existing resources and hence are exploitative-oriented (March, 1991; Wu, Zhang, Schroeder, 2011). Conversely, organic practices in the QMP construct are explorative-oriented as they promote insights, creativity and knowledge-creation (Hoang and Rothaermel, 2010; Molina-Castillo et al., 2011; Wu et al., 2011). Thus the combined effects of explorative- and exploitative practices in QMP lead to both incremental improvement of existing product quality, and generation of radical product and process innovations (Arostegui et al., 2013; Kim, Kumar and Kuma, 2012; Prajogo and Sohal, 2003, 2004). Some commentators suggest that explorative-oriented practices are more effective when the appropriate contexts, such as culture, are present (Naranjo-Valencia, Jimenez-Jimenez and Sanz-Valle, 2011; Wiengarten et al., 2013; Wu et al., 2011).

Specifically, it is argued that mechanistic practices such as information and analysis, customer focus, process management and strategic management are instrumental in regulating processes and outcomes (Kim et al., 2012; Ooi et al., 2012; Prajogo and Sohal, 2004), as the basic rationale behind these practices is to maximize outcomes from existing infrastructure via variation and waste eliminations (Deming, 1986; March, 1991; Molina-Castillo et al., 2011; Patel, Terjesenb and Li, 2012). However, there are also arguments against this view of mechanistic QM practices-led innovation, as its emphasis on predictability or conformance restricts creativity and experimentation of novel ideas and practices, especially in technologically turbulent and dynamic environments (Canato et al., 2013; Parast, 2011).

On the other hand, organic QM practices (see Table 2.1), such as leadership and people management (teamwork, empowerment, training and education), are forerunners of innovation performance (Hoang et al., 2006; Prajogo and Sohal, 2004). These practices promote information and ideas exchange, dissemination and assimilation, as well as foster a culture of openness, trust and proactivity—all of which, are quintessential characteristics of organization learning (Arostegui et al., 2013; Molina-Castillo et al., 2011; Hung et al., 2011; Senge, 1995).

However, scholars and experts warn that practitioners should not attempt isolated QM practices (Juran and Defoe, 2010; Kim et al., 2012; Sadikoglu and Olcay, 2014). As there are complex interactions between practices, a whole package of QMP is advised to be implemented (Kim et al., 2012; Sadikoglu and Olcay, 2014), and these complex interactions among QMP dimensions may lead to creation of embedded knowledge in QM routines (Choo et al., 2007; Cruz et al., 2014; Ooi et al., 2012; Perez-Arostegui et al. 2010; Wang and Wei, 2005). More recent studies, however, indicate new directions of research interest (see Table 2.8). Acting upon the suggestion by Prajogo and Sohal (2001), some researchers have studied influences of individual practice or groups of practices in the QMP construct (e.g. Sander Jones and Linderman, 2014; Silva et al., 2014), and they all support QMP positive influences on PIP though with direct effects (e.g. Mustafa and Bon, 2014) or mediated effects (e.g. Gil-Marques and Moreno-Luzon, 2013).

Summarizing the reviewed literature, evidence on the positive impact of QMP or its dimensions on PIP is generally supported, but authors differ on how QMP stimulates positive product innovation outcomes. Also in these studies, contextual factors were usually absent, except a few (e.g. Sander Jones and Linderman, 2014). Further studies with various contingent moderators are needed as little is known about their effects on the QM-innovation linkage (Raja and Wei, 2014).

2.4.7.2 Research evidence for quality management and product innovation performance relationship

The earliest research on QM practices leading to innovation performance is traceable to Flynn's (1994) empirical findings on the relationship between QM, infrastructure (human resource management, just-in-time system and organizational characteristics) and fast product innovation. Other early studies propose a positive view of QM—innovation relationship, based on the assumption that both QM and innovation rely on organization learning and human capital development (McAdam, Armstrong and Kelly, 1998). McAdam et al. (1998) report that continuous improvement implementation is an antecedent to a successful innovative culture, while Terziovski and Sohal (2000) share a similar view that QM leads to knowledge creation and improved product development capability. Mukherjee, Lapre and van Wassenhove (1998) discuss the role of double-loop learning (Argyris, 1976, 2004) in QM implementation, which leads to knowledge creation and an innovative environment (see also Choo, et al., 2007; Hung et al., 2010).

Interest in the QM and innovation relationship gathered momentum after Prajogo and Sohal published a series of studies on this subject (2001; 2003; 2004; 2006). In the conceptual paper, Prajogo and Sohal (2001) argued that the influence of QM practices on innovation is ambidextrous---exploitative QM implementation impedes innovation while explorative QM application promotes innovation (Asif and de Vries, 2014; Luzon and Pasola, 2011). The two authors point that three specific QM practices: 1) customer focus; 2) continuous improvement and; 3) people management are important to innovation performance. Table 2.7 summarizes the positive and negative impacts of QM on innovation according to Prajogo and Sohal (2001).

Further evidence for the positive relationship between QM and innovation was presented in two further studies by Prajogo and Sohal (2003, 2004). They reported positive influence of QM practices on product and process innovation performance (Prajogo and Sohal, 2003). In the 2004 study, they reported that mechanistic QM practices ("customer focus", "process management", "strategic planning", and "information and analysis") are related to quality performance and organic QM practices ("leadership" and "people management") contributing to innovative performance (Prajogo and Sohal, 2004). An important finding from this study is that there is no evidence that innovation performance benefits from emphasizing the organics QM practices and downplaying the mechanistic practices; they recommend QM practices to be implemented in a holistic manner to reap the maximum ambidextrous benefits of quality and innovation (Prajogo and Sohal, 2004). A similar finding was reported by Prajogo and Hong (2008) in their study of R&D units of South Korean manufacturing firms, where QM was found to have positive and significant impact on both product innovation and quality performance (similar result see Feng et al., 2006).

Table 2.7

Prajogo and Sohal's (2001) arguments for and against the quality management—innovation relationship

Positive View of Quality Management and Innovation		
Customer Focus	**Continuous Improvement**	**People Management**
• Put extra effort to meet and exceed customer needs and expectation. • Clear vision to innovation	• Encourage the firm to look for new ways to improve process and product. • Encourage experimentation and challenging the status quo.	• Empowerment and teamwork release creativity from employees. • Teamwork climate promotes exchange of ideas and organizational learning.
Negative View of Quality Management and Innovation		
Customer Focus	**Continuous Improvement**	**People Management**
• Focusing too much on customers renders the organization looking for opportunities to try for radical or disruptive innovation. • Market orientation is known to promote innovation only in competitive but not technology turbulent environment (Atuahene-Gima and Ko, 2001)	• Continuous improvement may be too incremental for a turbulent and dynamic environment. • Focus on single loop learning but not reflective learning that may challenge the paradigm (Senge, 1994)	• Teamwork may create Groupthink and inhibit radical idea generation, and encourages a culture of conformism. • Well defined processes and procedures restrict discretion of workers at work.

Source: Prajogo and Sohal (2001)

Other researchers also reported positive findings on the QM and innovation performance relationship. Hoang, Igel and Laosirihongthong (2006) investigated the relationship in Vietnamese firms, and reported that only QM practices of leadership, people management, process and strategic management and open organization are positively related to product innovation performance. Further evidence was reported by a Spanish study of Perdomo-Oritz, Gonzalez-Benito and Galende (2006, 2009), who suggested that organic or soft QM practices, such as human resources, are positively related to business innovation capability (see Prajogo and Sohal, 2001).

Similar findings were reported by a number of studies. Martinez-Costa and Martinez-Lorente (2008) concluded in their research that QM has a positive influence on process and product innovation performance, and Sa and Abrunhosa (2007) confirmed the linkage between QM and technological innovation in Portuguese footwear firms (see also Abrunhosa and Sa, 2008). Santos-Vijande and Alvarez-Gonzalez (2007) studied 93 Spanish firms and reported that QM has a direct positive impact on administrative innovation, while QM's impact on technological innovation is mediated by firm innovativeness.

More recent research also lends more support to the QM—innovation hypothesis, though there are contradictions on the role of individual quality practices on innovation. Hung et al. (2010) analysed the relationships between QM, knowledge management and innovation performance of Taiwanese high-tech manufacturing firms; they concluded that QM is a mediator between KM and innovation performance. In a second study by Hung et al. (2011a), QM practice is positively related to innovation performance mediated by organizational learning.

In contrast, the study of Kim et al. (2012) revealed that mechanistic QM practices, through process management, are positively related to five types of innovations, including incremental and radical innovations in product and process. Kim et al. (2012) asserted that to get the best innovation outcome, QM is best applied as an integrated package as individual QM practices are highly related. Ooi et al. (2012) also reported the contribution of mechanistic practices in positively relating QM and innovation performance in Malaysian manufacturing firms. Similar findings of positive QM-innovation performance relationship were found in other recent studies (Arostegui et al., 2013; Sadikoglu and Zehir, 2010; Zehir et al., 2012).

The most recent literature, however, indicates new research interests among scholars, as they show greater interest in: 1) how individual dimensions or group of dimensions affect PIP (e.g. Moreno-Luzon, Gil-Marques and Valls-Pasola, 2013); 2) the possibility of a mediating factor linking QMP and PIP (e.g. Song and Ding, 2013); and 3) the complementary effect of an strategic orientation (e.g. Silva et al. 2014) (see Table 2.8).

Some studies postulate that QMP is a multidimensional construct and different QM practices have different impacts on different performances such as operational efficiency and innovation (Sander Jones and Linderman, 2014). Gil-Marques and Moreno-Luzon (2013) focus on the human resources dimension of QMP and how related practices of teamwork, training and empowerment influence PIP; their study indicates the three practices influence PIP via mediation of exploitation and exploration cultures of firms. This is in line with some earlier findings (Hung et al., 2011a). Moreno-Luzon et al., (2013) investigate the same Spanish sample while operationalize TQM as “people management”, “customer focus” and “process management” for their investigation of the QM—PIP relationship; they report that the three factors indirectly stimulate radical and incremental innovation in product, as well as process through the mediation of exploitation and exploration cultures. So they suggest that an ambidextrous culture is needed for QM firms seeking enhanced innovation outcomes (Moreno-Luzon et al. 2013).

Similar findings are reported by Zeng, Auh and Matsui (2013) in a global trans-industry research project, where they conclude that soft practices (employee suggestion, small group problem solving and training) drive product and process innovations, while hard practices (process management, product design and quality information analysis) stimulate both innovations through the mediation of quality performances. Sander Jones and Linderman (2014) redefine QMP into “process design”, “process improvement” and “process control” and investigate their impacts on operational efficiency and product-process innovations under competitive intensity. Their research outcomes suggest that process design is positively and directly related to innovation without moderation, while process improvement—PIP is partially moderated by competition intensity (Sander Jones and Linderman, 2014). While these findings generally support the notion that QM as an integrated package influences PIP, the precise mechanism of how individual dimensions interact is still inconclusive. Differences in the reconceptualization of QMP also raises the long-time issue of inconsistency of QMP operationalizations between studies (Nair, 2006).

Still more recent research focuses on the suggestion that there is a missing link between QMP and PIP (e.g. Arostegui et al. 2013; Hung et al., 2011a; Moreno-Luzon et al., 2013; Song and Ding, 2013) and their findings are affirmative, suggesting that QM may be a precursor to innovative capabilities as suggested by Perdomo-Oritz et al. (2006). Another newer direction is to explore if the QM—PIP linkage is complemented by another independent variable such as a strategic orientation to enhance PIP (Silva et al, 2014) and firm performance (Wang, Chen and Chen, 2012), and current evidence shows positive support.

In summary, among the handful of QM-innovation empirical studies, there is some positive support for the relationship. Indeed, further finding from Shenawy, Baker and Lemark’s (2007) meta-analysis on 51 empirical studies of TQM and conclude that TQM practices collectively lead to achieving competitive advantage, and since competitive advantage originates from either cost-reduction or differentiation (Campbell-Hunt, 2000; Lemak, 1996; Shenawy et al. 2007), TQM practices increase the chance of success of differentiation en route product innovation (Miller, 1987, Porter, 1980). This reinforces the view that certain components of quality management foster internal capabilities including product innovation performance (Lee and Zhou, 2000), a view that is consistent with the resource-based theory of strategy (Barney, 1991). Thus, it is argued that QMP facilitates PIP and hence:

Hypothesis 2: A firm's level of quality management practices has a positive and significant relationship with its product innovation performance.

Nothwithstanding the supprotvie eviddnce for QMP—PIP relationsuiop, there are issues to be resolved. First, most studies have not included contextual factors in their models, but QM is also subject to contextual influences (cf. Santos-Vijande and Alvarez-Gonzalez, 2007). Second, most studies used a variety of measurements of quality management and innovation conceptualization, and innovation has the particular problem that it is multi-faceted and multi-levelled (Bessant, 2006; Rowley et al., 2011) which makes comparison difficult. Third, there are contradictory findings on the roles of organic and mechanistic QM practices on innovation performance. While some studies support the argument of organic elements supporting innovation (Prajogo and Sohal, 2004; Hoang et al., 2006), there are also findings that mechanistic practices lead to innovation (Kim et al., 2012; Ooi et al., 2012). As shown by the more recent studies, some researchers are interested to explore how individual dimensions affect PIP, with or without mediation (Moreno-Luzon et al., 2013; Silva et al., 2014) and their results are partially supportive or mixed. This reflects earlier suggestions that researchers and practitioners should not selectively, or excessively, weight certain practices over others, as QM elements have complex interrelationships and QM implementation requires a holistic approach (Kim et al., 2012; Prajogo and Sohal, 2004; Singh and Smith, 2004). Fourth, the most recent findings indicate that QM may combine with a strategic orientation to stimulate PIP (Silva et al., 2014). Lastly, since some studies do not specifically measure product innovation performance (PIP), a smaller sample of QM—PIP studies is available for reference. Table 2.8 summaries those studies involving QM and PIP.

2.4.8 Influence of contextual factors on quality management and product innovation performance

Even though studies on the QMP-performance relationship are generally supportive (e.g. Prajogo and Sohal, 2003), the overall findings are mixed as some research fails to confirm this linkage (e.g. Dooyoung, Kalinowski and El-Enein, 1998; Mohrman et al., 1995; Nair, 2006). Scholars have asked for more research on contextual influences on the QMP-performance study field, as many studies do not sufficiently account for impacts of environmental factors (Silas, 2007; Sousa and Voss, 2001), except a handful of investigations (e.g. Zhang, Linderman and Schroeder, 2012). This is also true for the smaller domain of QMP-innovation performance research, as very few published studies explore the impact of external contexts (e.g. Santos-Vijande and Alvarez-Gonzalez, 2007), even though scholars have advocated looking into the QM-performance issue with a contingency perspective for some time (Benson, Saraph and Schroeder, 1991; Sitkin, Sutcliffe and Schroeder, 1994). Hence, a brief review of studies on QMP-innovation performance under contextual influences is conducted. Followed by,a review of the broader QMP-operational performance field, as complementary insights may be gained for the potential influences of contextual variables on the QMP-PIP link.

Santos-Vijande and Alvarez-Gonzalez (2007) studied the influence of market turbulence on the QMP—innovation capability—organizational innovation mediated link. Market turbulence was conceptualized as the extent of changes in customers' preferences, customer composition and expectations for new products (Kohli and Jaworski, 1990; Slater and Narver, 1994). The results suggest that under an unstable and dynamic market condition, a QM firm has a stronger motivation to redeploy its resources exploratively for uncertain market demand (March, 1991; Santos-Vijande and Alvarez-Gonzalez, 2007). This conclusion is supported by studies outside the QMP—innovation genre. For example, an empirical study indicates that firm innovativeness has the strongest positive influence on business performance under high market turbulence with high competition intensity, in Taiwanese high-tech manufacturers (Tsai and Yang, 2013). High market turbulence is also reported to have a magnifying effect of open innovation's positive impact on firm performance (Hung and Chou, 2013)

Another QMP-innovation study by Sanders-Jones and Linderman (2014) examines the moderating effect of competitive intensity on process management's effects on efficiency and innovation performance. They reconceptualise QM practices as three components of process design, process improvement and process control (cf. Juran and Defoe, 2010) instead of the traditional individual practices, and results suggest that competitive intensity is only partially effective in moderating process improvement, and efficiency control and innovation performance (Sander Jones and Linderman, 2014). The two known studies of external moderating effects on QMP—innovation performance, provide insufficient evidence to draw meaningful conclusions, even though external variables may have an contingent effect on the link.

Looking into the broader literature of QMP—operational performance field, it is argued that absence of contextual factors in some studies contributes to mixed QMP—operational performance conclusions (e.g. Nair, 2006; Samson and Terziovski, 1999). Compared to internal/organizational contextual factors, fewer studies in the QMP—operational performance question examine the role of external variables. Wang, Chen and Chen's (2012) study confirms the moderating effect of competition intensity on QMP and hotel (operational) performance, suggesting that under intense rivalry QMP can stimulate greater attention to customers' expectations, which improves performance. Zhang et al. (2012) study the effects of organic/mechanistic organizational culture and environmental uncertainty on QMP—operational performance; their findings recommend a low uncertainty—mechanistic structure—exploitative quality practices combination for stable market conditions, and a high uncertainty—organic structure—explorative quality practices for dynamic market environments, a finding predicted by contingency theorists (Sitkin et al., 1994; Zhang et al., 2012).

The study by Benson et al.(1991) was one of the earliest to explore internal and external contextual factors in the QMP—operation performance question. They reported that top management support, firm's past quality performance, external competition intensity and government intervention of quality are factors that need to be addressed for QMP customization for performance (Benson et al., 1991; cf. Zhang et al., 2012). Customization of QMP refers to the fit between the choice and focus of the techniques adopted in each practice (Sousa and Voss, 2001; Zhang, Linderman and Schroeder, 2014). For example, under the practice of "process management", a firm is to implement techniques that ensure processes are efficient, predictable and precise enough to meet product specifications (Juran and Defoe, 2010; Oakland, 2014). Many techniques such as statistical process control (SPC), design for manufacturability, fool-proofing, and so on are available (Goetsch and Davis, 2012). Since there are numerous 'tools' in the 'toolbox', a firm has to coherently select those that are relevant and supportive to its competitive position (Miles and Snow, 1978; Porter, 1985; Prajogo and Sohal, 2006).

Sharing this line of logic, Sousa and Voss (2001) discuss the need for inclusion of organizational context in studying QMP-operation performance, and claim that QMP should be "customized" to a firm's chosen manufacturing strategy for optimal outcomes (Hill, 1985). Asif et al. (2009) also support the view that QMP needs to be adapted according to the competitive strategy of the firm (Porter, 1985) for improved operational outcomes, and their findings are consistent with earlier findings (Dean and Snell, 1996; Ketokivi and Schroeder, 2004; Sousa and Voss, 2001).

Another contextual moderator in QMP—operational performance studies that attracts researchers' attention is national cultural values. Research indicates that they have an important bearing on QM performance (Kull and Wacker, 2010; Naor et al., 2008; Wu and Zhang, 2013). Kull and Wacker (2010) also reveal that firm size and GDP of East Asian countries (China, Taiwan and South Korea), together with two dimensions of Hofstede's national cultural values (high uncertainty avoidance and low assertiveness) have an impact on QMP—quality (operational) performance (Hofstede, Hofstede and Minkov, 2010); indicating the role of national values and factors needing to be addressed (Kull and Wacker, 2010; Wu and Zhang, 2013). Wu and Zhang (2013) make a similar conclusion claiming that power distance and uncertainty avoidance (Hofstede et al., 2010) are instrumental to QM implementation and outcomes in Chinese cultural environments. These results indicate that more studies on

QMP—operational performance are needed due to the Chinese cultural idiosyncrasy (Wu and Zhang, 2013).

Organizational culture is another internal contextual factor prevalent in the QM—performance literature, and has long been suggested as a crucial element in QM implementation (Asif et al., 2009; Deming, 1986). Wiengarten et al. (2013) report that a culture of innovativeness positively moderates QMP's impact on operational performance, and this is consistent with other studies in this stream (Ahmed, Loh and Zairi, 1999; Baird et al., 2011; Detert, Schroeder and Mauriel, 2000; Jung and Hong, 2009; Gimenez-Espin, Jimenez-Jimenez and Martinez-Costa, 2013). Wu et al. (2011) conclude that explorative-oriented QM practices are more linked to operation performance when QM principles have become the dominant organizational culture, otherwise exploitative QMP should be adopted. All these findings confirm the earlier theoretical development of Sitkin et al. (1994), about the need to distinguish and apply the exploitative and explorative forms of QM under different internal contingencies.

Other contextual variables are also reported to have positive effects on: QM and operational performance: buyer-supplier relationships (Fynes and Voss, 2002); high commitment human resource strategy (Bou and Beltran, 2007); market orientation (Demirbag et al. 2006) and customer orientation (Pinho, 2008). These are all suggested to have strengthened the effect of QMP. This is not surprising as these factors are equivalent to elements in the integral QMP package. For example, a market or customer orientation is likely to magnify or complement the "customer focus" practice in QMP and intensifies its effect on operational performance (Demirbag et al. 2006; Pinho, 2008).

However not all studies support the claim that contextual factors have an influence on QMP—operation performance. In a study by Sila (2007), QMP are found to have positive impacts on human resource, customer and organizational effectiveness (operational performance) across all subgroups of each institutional factor (TQM and non-TQM firms; ISO 9001 registered and non-ISO 9001 firms; US-owned and foreign-owned firms) and contingency factor (company size, domestic and international operations) leading the researcher to claim the universal applicability of QMP (Sila, 2007). This is in contrast to Jayaram, Ahire and Dreyfu (2010), who claim that industry type, firm size and QM implementation have significant moderating effects on QMP—operation performance, and thus their conclusion favours a contingency view (cf. Sila, 2007).

In summary, by examining the extant QMP—innovation and QMP—operational performance literature, a number of contextual factors such as organizational culture, national cultural values, market turbulence, competitive intensity, market orientation and environmental uncertainty have been identified (e.g. Sander Jones and Linderman, 2014; Wang et al., 2012; Wu and Zhang, 2013; Zhang et al., 2012). However, the majority of these contextual variables are related to organizational characteristics, rather than external environmental factors, and no published research to test the QMP—PIP link with multiple moderating variables was found. This becomes a relevant research agenda as only through testing multiple contextual moderators can the complexity of an organization and its environment be more realistically captured in a research model (Damanpour, 1991 & 1996). There is an even stronger need for studying the model in a context outside the western situation and mindset (Stam, Arzlanian and Elfring, 2014).

Table 2.8

Summary of findings supporting quality management and product innovation performance

Researchers	Sample Size	Findings on QM—PIP
Flynn (1994)	712 respondents (42 firms)	Plants using strong QM practices lead to shorter new product introduction cycles.
Naveh and Erez (2004)	425 respondents in 4 Israelis plants	Different quality practise have different impacts on innovation; ISO 9000 has negative impact on innovation whereas quality goal-setting and teamwork have positive impacts on innovative performance.
Prajogo and Sohal (2003)	194 managers in Australia	QM practices related positively to quality and product innovation performance.
Prajogo and Sohal (2004)	194 managers in Australia	Organic QM elements related to product innovation performance, mechanistic elements related to quality performance.
Feng et al., 2006	252 firms: 194 Australian & 38 Singaporean firms	Organic QM elements related to product and process innovation performance.
Hoang et al. (2006)	204 firms in Vietnam	Positive relationship between QM and product innovation performance. Only QM practices of leadership, people management, process and strategic management and open organization have impact on product innovation.
Martinez-Costa and Martinez-Lorente (2008)	451 firms in Spain	Positive relationship between QM practices and product and process innovation, and QM practices are positively related to firm performance.
Prajogo and Hong (2008)	130 R&D units in South Korea manufacturing firms	Positive relationship between QM practices and product innovation.
Hung et al. (2011)	223 Taiwanese high-tech firms	QM practices are positively related to product and process innovation performance, and mediated by organizational learning.
Ooi et al. (2012)	206 Malaysian managers	QM practices of customer focus, leadership, strategic management, process management and people management are positively related to process and product innovation.
Kim et al. (2012)	223 Canadian firms	QM practices, through process management, has a positive impact on radical and incremental product/process innovation, and administrative innovation.
Arostegui et al. (2013)	230 Spanish firms	QM practices leads to absorptive capacity (mediator), which in turn is positively related to process and product innovation performance.
Gil-Marques and Moreno-Luzon (2013)	72 Spanish firms in furniture and textile industry	Human resource management practices (such as teamwork, training and empowerment) have an indirect impact on radical and incremental product and process innovation performance, mediated by exploitation and exploration.
Moreno-Luzon, Gil-Marques and Valls-Pasola (2013)	72 Spanish firms in furniture and textile industry	People management, customer focus and process management of QMP have direct impact on incremental product and process innovation. While mediated by cultural change, the 3 QM practices can positively influence both incremental and radical innovation.
Song and Ding (2013)	198 Chinese firm with quality management certification	QM practices influence product innovation performance through the mediation of R&D capability, and innovation leads to improved firm performance.
Zeng, Auh and Matsui (2013)	238 plants in 8 countries in	"Soft" practices in QMP (such as employee suggestion, small group problem-solving and training) drives "hard"

	electronics, machinery and transportation equipment	practices (process management, product design and quality information), and hard practices→quality performance→product & process innovation performance; while soft practices→innovation performance.
Silva et al. (2014)	112 Portuguese exporting manufacturing firms	TQM is reconceptualised as three blocks: Independent variable #1 *TQM resources* 1) product design capability (design quality management, supplier involvement, use of FMEA); 2) TQM culture (top management commitment, customer focus and HRM); 3) Process improvement capability (use of SPC; benchmarking and internal quality information usage) Independent variable #2 *Innovation resources* **a)** Innovation orientation **b)** Product innovation capability (2 sub dimensions): • Market sensing • Product development Results: 1) Product design capability has a positive impact on PIP 2) Product innovation capability has a direct impact on PIP
Mustafa and Bon (2014)	650 service firms in Malaysia with QM certification	TQM (QMP) are positively related to incremental and radical service and product innovation performances, as well as to administrative innovation performance.
Sanders Jones and Linderman (2014)	238 plants in 8 countries in a global research project	QMP is operationalized as “process design”, “process improvement” and “process control”, and tested against innovation performance and efficiency. . • Process design is positively related to innovation without moderation. • Competitive intensity negatively moderates process control and innovation • Competitive intensity moderates partially process improvement and innovation

2.4.9 Arguments against quality management and innovation performance relationship

While extant studies generally support the view that QM leads to innovation performance enhancement, there have been several arguments against the concept. First, the foremost tenet of QM is customer focus and product development is expected to incorporate market needs and expectations through the use of quality tools such as quality functional deployment (QFD) and value analysis (Sun and Zhao, 2010). However there is strong evidence, in the product innovation literature, that being too close to the market sometimes results in counterproductive product innovation outcomes (Atuahene-Gima, 1996). It is imperative to distinguish which group of customers to listen to—mainstream or advanced customers, for improving the novelty of new products (Govindarajan, Kopalle and Danneels, 2011), and it is contingent on management's innovativeness in translating market feedback into innovation strategy especially under technological turbulent environments (Verhees and Meulenberg, 2004; Zhang and Duan, 2010). This finding is in line with Prajogo and Sohal's (2001) assertion that following customers too closely is potentially an impediment to successful PIP. A meta-analysis of the market-pull and technology-push debate for innovation generation, by Di Stefanoa, Gambardella and Verona (2012), reports the roles of internal resources, entrepreneurship and the interplay between demand and technology as sources of product innovation.

In addition the practice of continuous improvement, whether in the form of the Deming PDCA (Plan-Do-Check-Act) cycle or Six Sigma's DMAIC (Define-Measure-Analyse-Improve-Control) methodology, the focus is to enhance performance in speed, efficiency, predictability and value-adding (Guo, Zhao and Wang, 2014). Product innovation personnel working in a QM practising firm are coerced to comply with highly structured processes and routines, and performance or progress is evaluated by metrics. However, these practices are potentially counterproductive to creativity and experimentation of novel ideas (Canato et al. 2013; Johnstone, Pairaudeau, and Pettersson, 2011), and more suited to less technological turbulent environments (Narver et al., 2004). Some studies also report no evidence for QM practices alone leading to PIP (Leavengood, Anderson and Daim, 2012; Prajogo and Sohal, 2006; Singh and Smith, 2004). Even for a study on QM practices on PIP in R&D units, there is a lack of contextual factors, such as competition intensity and technology turbulence, included in the model (Prajogo and Hong, 2008). This implies that the QM—PIP linkage is not robust under different contexts and influences. Besides, most QM and continuous improvement initiatives stress value-adding and waste elimination which, if pursued relentlessly, lead to a low level of unabsorbed organizational slack and is detrimental to innovation performance due to lack of spare resources for exploration (H Liu et al., 2014; Nohria and Gulati, 1996; Voss, Sirdeshmukh and Voss, 2008).

Other mechanistic QM practices such as information analysis, strategic planning and process management share a similar problem of restricting creativity and experimentation (Canato et al., 2013) and lowering levels of proactivity and risk taking (Voss et al., 2008) with higher levels of occupational stress (Lukas, Menon and Bell, 2002) and reliance on a single-loop learning approach to problem recognition or solving (Tosey, Visser and Saunders, 2011). All these QM practices lead to effective fulfilment of exploitative operational performance, such as quality outcomes (Prajogo and Sohal, 2003, 2004). Another potential danger of relentless application of mechanistic practices is that the firm becomes too obsessed with perfecting existing products and processes, which is known as "monozukuri" in Japanese (Tsunoda and Nakano, 2011), and ignoring disruptive technological substitutes (Govindarajan et al., 2011).

To facilitate innovation in a QM system, psychological safety (Choo, Linderman and Schroeder, 2007a; Edmondson, 1999) is a prerequisite for empowering employees for proactive, risk taking and explorative learning behaviour. Choo et al. (2007a) argue that with this psychological safety, employees are motivated to see a problem as opportunity and therefore facilitates knowledge creation under a QM climate. This resonates with a teaching of Deming's quality principle of "drive out fear", or allowing employees to be free from punishment for making honest mistakes (Deming, 1986).

To create such a psychologically safe organizational context, Choo et al., (2007b) suggest the following are needed: 1) committed leadership toward organizational learning; 2) sufficient resources as slack for innovation opportunity recognition and exploration; 3) engaging employees with challenging work and soliciting innovative solutions and 4) providing psychology safety and freedom for risk-taking.

The same group of researchers also recommended loose coupling of exploitative processes and explorative activities, or structurally and socially separating the two (Choo et al., 2007b). Application examples of loose-coupling are the establishment of ‘skunk works’ or autonomous product development teams (Patanakul, Chen and Lynn, 2012). Anecdotal evidence confirms the effectiveness of these two approaches to house exploitative QM and explorative QM—PIP activities in the same organization, and two such successful examples are General Electric’s Six Sigma Program (Guo, Zhao and Wang, 2014) and Toyota’s process management and product development of hybrid/hydrogen cars (Pohl, 2012).

2.4.10 Research not supporting the quality management and product innovation relationship

Despite a larger portion of studies in the QM—PIP field supporting the hypothesis, there are findings that do not agree with this view. It is useful to survey these findings and Table 2.9 summarizes the results of these studies.

Singh and Smith (2004) studied 418 Australian firms and reported that there is no significant relationship between quality practices and general innovation performance, including PIP. They suggested that the lack of relationship between the two variables was due to its underlying complexity . Similar findings were found in

Prajogo and Sohal's study (2006) on the relationships of QM, R&D management with quality and PIP with an Australian sample (N=194). In their research, QM is found to have no significant relationship with innovation performance (product and process) but has positive influence on quality performance (Prajogo and Sohal, 2006).

Reyes, Vega and Martinez (2006) analysed 84 Spanish firms certified with the ISO-9001 quality management system, and discovered that QM practices have no significant relationship with product and process innovation performance. Cole and Matsumiya (2008) conducted a case study with three Japanese high-tech firms, and concluded that quality culture in these Japanese firms inhibited proactive innovation performance (including product and process innovation outcomes). Leavengood and Anderson (2011) found no direct relationship between QM practices and product and process innovation performance in 215 American West Coast forest products firms, and further commented that a TQM culture promotes a reactive attitude to customer complaints rather than gearing towards innovation for proactively satisfying latent needs.

Though the majority of findings on QM—product innovation relationship support the notion, the small number of available studies and their conflicting results indicate that more critical research, using different methodologies and cross-disciplinary lenses, is needed for improving clarity and academic attention to the subject (Raja and Wei, 2014; Singh et al., 2006).

Table 2.9

Summary of selected research findings not supporting the quality management and innovation performance.

Researchers	Sample Size	Findings on QM--PIP
Singh and Smith (2004)	418 Australian firms	No positive relationship between QM and innovation, suggests the relationship is more complex than they original conceptualized
Prajogo and Sohal (2006)	194 Australian managers	QM has no significant relationship with innovation performance.
Reyes, Vega and Martinez (2006)	84 Spanish firms	There is no direct relationship between quality management system (ISO 9001) and innovation.
Cole and Matsumiya (2008)	3 case studies from Japanese high-tech firms	Quality culture in Japanese high-tech firms inhibits innovation, especially in radical innovation.
Leavengood and Anderson (2011)	215 US west coast firms	TQM has negative relationship with innovative performance in quality oriented firms

2.5 Influence of contextual factors on entrepreneurial orientation, quality management and product innovation performance

After reviewing literature pertinent to QM and EO, one can observe a relative silence in studying QMP—PIP under contextual moderators, in contrast to the EO literature. In the EO field, there are relatively more studies focusing on EO's relationships with firm performance and PIP under contextual moderators (e.g. Brouthers, Nakos and Dimitratos, 2014; Chiang, 2013; Engelen et al., 2012; Grunhagen et al., 2014; Lechner and Gudmundsson, 2014; Lumpkin and Dess, 2001, Stam and Elfring, 2008; Tang and Tang, 2012; Wales et al., 2013a), though very few studies specifically focus on EO + QM on innovation performance/organizational performance (e.g. Al-Swidi and Mahmood, 2012), and none is tested with external moderators. The following is a brief overview of this highly focused and scant area of research interest, the EO + QM—performance linkage moderator, and ends with summary discussion.

Surveying prior research on the specific EO + QMP—performance relationship, only one published empirical study was identified (Al-Swidi and Mahmood, 2012) and none on PIP. In this single study, the authors attempt to verify to what extent the relationship between EO, QMP and organizational performance is influenced by the moderator of Denison's organizational culture traits of involvement, consistency, adaptability and mission (Al-Swidi and Mahmood, 2012; Denison, 2000). Their findings indicate that the moderated EO + QMP on performance model is supported, suggesting a compatible culture is essential to the complementary EO and QMP's impact (Al-Swidi and Mahmood, 2012). It has been suggested repeatedly that a success QM programme hinges on a supportive organizational culture (Gimenez-Espin et al., 2013). Likewise, prior studies (e.g. Engelen et al., 2010; Naranjo-Valencia et al., 2011) also indicate that the importance of organizational mindset (such as EO) with a knowledge creation/resource orchestration capability (such as QM) (Benner, 2009; Cruz et al., 2014; Hung et al., 2011; Perez-Arostegui, Sousa and Benitez-Amado, 2010) are crucial for optimal performance. Nevertheless, findings from one study are inconclusive and inadequate as evidence of the relationships of interest.

This is a substantially under-researched area given some scholars claim that QM is a capability (Benner, 2009; Cruz et al., 2014; Douglas, Jenkins and Kennedy, 2012). Wang and Ahmed (2007) argue that when QMP are executed as an integrated package, firm-specific tacit knowledge is involved in their implementation, and resource utilization and redistribution hence QMP should be viewed as an adaptive capability (Wang and Ahmed, 2007). Perez-Arostegui et al. (2010) indicate that absorptive capacity, a dynamic capability (Reilly and Shakery Scott, 2010; Zahra et al., 2006), is embedded in the integrated platform for QMP. Moreno-Luzon and Valls-Pasola (2011) also conclude that QM overlaps with the concepts of ambidexterity (exploitation and exploration), and an integrated QM programme such as TQM leads to ambidexterity operational capabilities---abilities to engage product improvement and innovation under one roof. Additionally, QMP strengthens a firm's strategic flexibility to changing environments (Asif and de Vries, 2014; Benner, 2009; Kortmann et al., 2014; Moreno-Luzon and Valls-Pasola, 2013). Strategic flexibility can be understood as a set of capabilities to reallocate and reconfigure resources to cope with turbulent external demands (Hitt, Ireland and Hoskisson, 2014; Sanchez, 1997; Sirmon et al., 2012) and fosters PIP (Li et al. 2010). Therefore, when transient opportunities emerge, EO heightens a firm's intention to innovate (e.g. Boso et al., 2012), and if the firm has QMP in place the likelihood of explorative outcomes increase and lead to increased PIP (Storey and Hughes, 2013).

The same conclusion can be reached from another perspective, as QMP comprises "customer focus" (meeting internal and external customers' expectation), "information and analysis" (systematic acquisition, dissemination and application of information) and "benchmarking" (competition monitoring) processes (Oakland, 2014), it is fair to consider market-orientation is embedded in TQM (Jaworski and Kohli, 1996; Malik, Sinha and Blumenfeld, 2012; Wang and Wei, 2005). As shown by Boso et al.'s (2012) findings, firms with high EO and high MO led to PIP, hence there is an empirical foundation to assume such repetition may occur in some contexts (see also Atuahene-Gima and Ko, 2001) . In summary, by looking into prior findings, a proposed study of EO, QMP and PIP with external moderators is conceptually congruent with scattered theories in various fields, and presents a unique contribution to this less studied domain.

2.6 Moderating factors of Market Unfairness, Policy Support and Competition Intensity

2.6.1 Contingent role of market unfairness in EO and QMP relationships with product innovation performance

Market unfairness or dysfunctional competition refers to the situation when firms are engaging in unfair, deceitful, opportunistic and even illegal practices in their competition for the market (Li and Atuahene-Gima, 2001). The measurement of this construct was first developed by Li and Atuahene-Gima (2001) in their study of new technology ventures in China. Though not restricted to be a transitional economy phenomenon, market unfairness is more rampant in those economies (Hoskisson et al., 2000; Sheng, Zhou and Lessassy, 2013).

According to institutional theory, as centralized economies transit to market economies, formal constraints like political and legal rules are dismantled and rebuilt to the new market-based paradigm, thus leading to an uncertain or uneven legal enforcement environment (Peng and Heath, 1996; Scott, 2008; Young et al., 2014). Under this legal enforcement inadequacy, property rights are not well defined and protection of rights is not effectively enforced (Choi, Lee and Kim, 1999; Hoskisson et al., 2000; Jean, 2014; Li and Zhang, 2011; Peng, 2003). This legal enforcement vacuum thus encourages opportunistic practices of infringing property rights of others, including intellectual property right (Peng and Luo, 2000; Sheng, Zhou and Lessassy, 2013). As a result, unfair competitive behaviours such as close product design imitation, reverse engineering of patent-protected technologies, even outright counterfeiting may occur (Li and Atuahene-Gima, 2001; Zhu, Wittmann and Peng, 2012) that offset the pioneer's initial advantage (Zhou, 2006).

Research on the specific role of dysfunctional competition/market unfairness in the extant innovation literature is scant. Some researchers used broader-meaning contextual constructs, such as institutional environment to incorporate the effect of unfair competition in transitional economies (Jean, Sinkovics and Hiebaum, 2014). Specifically, Li and Atuahene-Gima (2001) first used dysfunctional competition as a negative moderator for product innovation and new technology ventures performance in China, and reported that the moderating effect is insignificant. However, it is notable that in their study the sample was drawn from a Beijing high-tech zone and solely focused on new start-ups, thus the generalization was limited, as noted by the authors (Li and Atuahene-Gima, 2001), especially given the marked differences in industrial structural and technology dynamism across the three information and computer technology industrial hubs in China (Beijing, Shanghai-Suzhou and Pearl River Delta) (Zhou et al., 2011).

Other research that adopted the dysfunctional competition moderating variable was conducted by Sheng et al. (2013). They tested the contextual effect of unfair competition on the two relationships of technological radicalness/new product development and firm performance in China. Their results indicate that unfair market competition only has a negative moderating effect on new product development speed and firm performance (Sheng et al., 2013).

2.6.1.1 Review of market unfairness's impact on EO and product innovation performance

Although direct research evidence about the impact of market unfairness on EO—PIP and QMP—PIP relationships is very scarce, the EO and QM literature provides some indirect insight on the question. One explanation for the motivation of en entrepreneurial firm to involve in risky ventures, such as product innovation, is its managerial approach of calculated risk-taking. With incomplete information, the entrepreneurial firm makes assumptions that, in its best judgement, leads to high probability of economic returns. When market unfairness becomes rampant, the rational entrepreneurial firm will thus curtail its risk-taking, leading to lowering of PIP. In some sectors of the competitive Chinese environment, market unfairness or dysfunctional competition is well documented (Jean, 2014; Qian, Cao and Takeuchi, 2013; Sheng et al., 2013).

In fact, many foreign firms, suffer losses from piracy incidents in China (Keupp, Beckenbauer & Gassmann, 2009; McHardy Reid and MacKinnon, 2010). Since Li and Atuahene-Gima's (2001) study, the unethical competitive environment in China has not significantly improved (Gao, 2011; Hunter and Puliti, 2012). As Chinese firms practicing of free-riding on others' innovation has become a norm, Hong Kong managers are less inclined to commit to exploit NPD opportunities (Hoecht and Trott, 2014; Minagawa, Trott and Hoecht, 2007; Leung, 2013). Hence, it is suggested here that:

Hypothesis 1a: The positive relationship between the firm's entrepreneurial-orientation and its product innovation performance is weakened by competition unfairness.

2.6.1.2 Review of market unfairness's impact on QMP and product innovation performance

From the QM literature, recent research suggests that organizational perception of external uncertainty has an important influence on the firm's choice to adopt QM implementation, either exploitatively (focus on seeking quality perfection and process efficiency) or exploratively (focus on experimentation and learning) (Zhang, et al., 2013). Unfortunately, QM studies conducted in the Chinese context with environmental factors are scant (e.g. Wong et al., 2013; Zhao, Yeung and Lee, 2004), and results are inconclusive, insufficient or dated. More research is needed to clarify the QM—PIP and the general QM—PIP relationships under unfair competition conditions.

Notwithstanding the limited direct study of QM—PIP under market unfairness, arguments from the broader literature offer support for this position. Since product imitation or outright piracy are rampant (Keane and Zhao, 2012; Orr and Roth, 2012; Goxe, 2012; Zhao, 2006), and legal protection is unreliable (Keupp, Beckenbauer & Gassmann, 2009), Hong Kong firms stand a better position to compete with superior quality and operational performances, which give them more immediate direct business results and advantage. Since QMP can be implemented exploitatively or exploratively (Moreno-Luzon and Pasola, 2011), HKEI firms are more inclined to exploit QMP for non-innovation outcomes. Therefore:

Hypothesis 2a: The positive relationship between the firm's quality management practices and its product innovation performance is weakened by competition unfairness.

2.6.2 Contingent role of policy support in EO and QMP relationships with product innovation performance

Policy support or institutional support refers to the extent that firms receive support from government agencies in the forms of financial, materials, labour, export/import, administrative, technical and tax/fiscal assistance to overcome difficulties arising from inadequate institutional infrastructure in a transitional environment (Li and Atuahene-Gima, 2001 & 2002). The construct of policy or institutional support was first operationalized by Li and Atuahene-Gima (2001) in their study of new technology ventures.

Policy support is particularly critical for product innovation in transitional economies and, as product innovation is a resource consuming and risky activity (Kor and Mahoney, 2005; Yi, Wang and Kafouros, 2013), public authorities still play an important role in redistributing resources in these economies (Wu, 2011; Yi et al., 2013; Zhu, Wittmann and Peng, 2012).

Zhu et al. (2012) identified five key institutional-based barriers to innovation for small and medium enterprises (SMEs) in China: competition fairness access to financing, laws and regulations, tax burden and support systems. To lower these innovation hurdles, the Chinese government has pursued a series of better coordinated policies to stimulate private innovation through tax, financial and administrative measures (Liu, Liu and Jackson, 2011; Wu, 2011). Furthermore, "*guanxi*", the political ties or informal connections between firm and officials play an instrumental role in helping managers to make better adaptive decisions (Peng and Luo, 2003; Xia and Pearce, 1996; Xie, Liu and Gao, 2014), especially during periods of policy discontinuities or major reversal, that are common and frequent in transitional economies (Chen and Ku, 2014; Lu, Huang and Wang, 2012).

Empirical evidence provides some mixed support to the argument that policy support plays an important role in product innovation performance (PIP) at firm level. Li and Atuahene-Gima (2001) indicate that policy support has a significant effect on enhancing the effectiveness of product innovation strategy and hence leads to improved firm performance; this finding is consistent with the general view of the literature (Yi et al., 2013).

In a survey of 1244 Chinese manufacturing firms by Guan et al. (2009), the authors reported that high-tech firms perform better than general firms in terms of product innovation performance, They attributed these differences in innovation performance to the support from the Chinese government, as it confers more favourable policy support on these high-tech firms for the purpose of national strategic goals (Liu et al., 2011; Guan et al., 2009). Findings reported by Zhang, Peng and Li (2008) share a similar conclusion that policies of funding, human resource, technology and market are crucial to the success of technological entrepreneurship at a regional level.

In Jean, Sinkovics and Hiebaum's study (2014) of co-innovation of products with global automotive suppliers in China, their results indicate that a hostile institutional support does adversely affect the linkage of supplier product innovation and customer-supplier relationship (Jean et al., 2014). This also provides evidence of the importance of policy support in emerging economies' context, especially during the time of major industrial restructuring as in the case of the Pearl River Delta (PRD) region of Southern China (Yang, 2014).

2.6.2.1 Review of policy support's impact on EO and product innovation performance

Given the above evidence, it becomes conclusive that policy support is conducive to the EO—PIP relationship (Cai et al., 2014; Liu et al., 2011; Yi et al., 2013). In the Chinese context, policy-supported firms have the advantages of earlier opportunity-recognition (Cai et al., 2014; Liu et al., 2011), which translates to pre-emptive entry barrier-building (Dobson and Safarian, 2008; Zhou, 2006), and critical timing for exploiting China's discontinuous policy stance (Wells and Nieuwenhuis, 2012). Hence, the policy-supported EO firm has an increased likelihood to improve product innovation outcomes (Liu et al., 2011; Yi et al., 2013).

However, close government support also carries a cost to firms (Wu, 2011). Luo, Huang and Wang (2012), concludes that policy support from government-ties shows a strong influence on financial performance, but a weaker influence on operational performances (Luo et al., 2012; Guan and Yam, 2014), such as product innovation output. In fact some argue that strong policy support can be counterproductive and breed complacency and lower competitiveness (Peighambari et al., 2014; Wu, 2011). Some studies report government support has a limited role in improving entrepreneurial firms' PIP (e.g. Guan and Yam, 2014). For the case of Hong Kong firms, reliance on Chinese policy incentives tends to restrict firms' entrepreneurial nimbleness to global market dynamics (Yang, 2014), and diminishes their exploration of innovative product ideas. Hence:

Hypothesis 1b: The positive relationship between the firm's entrepreneurial-orientation and its product innovation performance is weakened by policy support.

2.6.2.2 Review of policy support's impact on QMP and product innovation performance

The extant literature is relatively silent on the impact of policy support on the QMP—PIP relationship, though reasoning can be developed from related fields. As discussed earlier, QMP can be considered both as a resource utilization capability and has potential to be implemented exploratively (Wu and Zhang, 2013) thus leading to new knowledge absorption which facilitates PIP (Cruz et al., 2014; Hung et al., 2011a; McAdam et al., 2014). In addition implementation enhances exploitative practice for operational and quality performance (Zhang, Linderman and Schroeder, 2014). If these conditions are implemented under a supportive policy environment, the QM firm will have easier access to key knowledge-based resources, such as import and licensing of foreign high-tech software, hardware and training (Cai et al., 2014). This facilitates knowledge absorption and application, and leads to better product innovation (Cruz et al., 2014; Perez-Arostegui et al., 2013). The critical point here is that Chinese government still has a tight control on strategic resources and industries despite 30 years of economic reform (Haley and Haley, 2013; Peighambari et al., 2014). Hence, QMP is more likely to generate product innovation under a supportive policy environment for firms in the Chinese economic-political environment. Hence it is proposed that:

Hypothesis 2b: ***The positive relationship between the firm's quality management practices and its product innovation performance is intensified by policy support.***

2.6.3 Contingent role of competition intensity in EO and QMP relationships with product innovation performance

Competitive intensity refers to the "degree of competition that a firm faces within the industry" (Zhou, 2006 p396). As postulated by Porter (1980), high intensity of competition occurs in a market whenever there is a high concentration of competing firms, and a general lack of opportunities to differentiate, expand or exit (Miller and Friesen, 1986). The situation becomes more pronounced when the incumbents simultaneously face the four extra-industry competitive pressures, namely, bargaining powers of suppliers and buyers, threats of substitutes and new entrants (Jennings and Lumpkin, 1992; Porter, 1980). As competition intensifies, competing firms are inclined to engage price wars which are destructive to all incumbents (Porter, 2008). Under these circumstances, rational firms have a greater propensity to compete differently, through proactive and risk-taking behaviours and increasing innovation efforts, which stimulates product innovation outcomes (Auh and Menguc, 2005; Bonanno and Haworth, 1998; Boone, 2001; Evanschitzky et al., 2012; Su et al., 2013; Zahra, 1993; Zhou, 2006).

2.6.3.1 Review of competitive intensity's impact on EO and product innovation performance

The interplay between competition intensity and EO on PIP, particularly in the Chinese context, has received some limited attention (Atuahene-Gima and Ko, 2001; Zhou et al., 2005). This finding is agreed by another subsequent study, which reports similar enhancing effects of the moderator on EO and market-based innovation in Chinese firms (Zhou et al. 2005). These results find support from another study of Chinese firms, indicating that the relationship between innovation strategy and performance improves when competitive intensity increases (Zhou, 2006). Direct research of the interactions among the three variables is scarce, but indirect evidence exists for the moderated relationship.

In their classical study of small firms, Covin and Slevin (1989) conclude that under hostile environments, small businesses have a stronger propensity to adopt EO, and become more willing to innovate. Auh and Menguc (2005) report that firm performance improves under explorative learning when competition intensifies (Zahra and George, 2002). Additional evidence is also reported for the positive effect of competition intensity on EO--PIP for entrepreneurial investors (Norback and Persson, 2012).

When interpreting in Porter's (1980) framework, one could argue that when rivalry increases, entrepreneurial firms have a greater propensity to escape competitive pressure by competing differently, so as to avoid price reduction pressures (Porter, 2008). Such entrepreneurial firms will actively seek unexplored innovation opportunities (i.e. proactiveness) (Teece, 2012; Zahra, 2008), being more tolerant to uncertainty inherent in these initiatives (i.e. risk-taking). They will focus their energy and resources to launch novel and hard-to-imitate technologies, products and systems (i.e. innovativeness) (Covin and Slevin, 1989; Wan, Williamson and Yin, 2014) to differentiate themselves from rivals by means of uniqueness and superior value of their offerings (Porter, 2008). Even if imitators or new entrants intensify their catch-up activity through incremental innovation (Bell and Figueiredo, 2012; Hu and Wu, 2011), EO firms will seek to develop radical product innovations that redefine the competitive priorities of the sector (Gambardella and McGahan, 2010; Teece, 2012; Bergek et al., 2013). Based on relevant literature evidence, EO firms are suggested to be more ready to leverage on product innovation for mitigating competitive pressures.

Hence it is prorposed that:

Hypothesis 1c: The positive relationship between the firm's entrepreneurial-orientation and its product innovation performance is intensified by competition intensity.

2.6.3.2 Review of competitive intensity's impact on QMP and product innovation performance

The electronics manufacturing industry in the Pearl River Delta (PRD) is primarily made up of larger foreign owned establishments, state-owned enterprises or joint ventures, and numerous small-medium producers owned by mainland or 'overseas' Chinese (Peighambari et al., 2014). Many HKEI firms are of the second category (Diez et al., 2013). Generally, the electronics clusters in the PRD are highly integrated with the global production networks of multinationals (Meyer et al., 2012). Firms in these regions compete and survive on their operational agilities to fulfil global demands and responses, which are often short-cycled (Li, 2010; Liu et al., 2014) and competition is immensely intensive (Kroll and Schiller, 2012).

In order to survive in such competitive conditions, larger and global firms rely heavily on outsourcing to other firms in the PRD, with an emphasis on multiple competitive priorities of quality, speed, flexibility and most importantly cost reduction (Gunasekaran, Lai and Cheng, 2008; Zu and Kaynack, 2012). To meet these multiple demands and remain in business, many firms implement QM systems (an integrated system of QMP) to improve operational performances for meeting higher-tier partners' expectations and remain in business (Vanichchinchai and Igel, 2011; Wittstruck and Teuteberg, 2012). Although prior literature suggests that integral QMP implementation may foster PIP (Hung et al., 2011a; Kim et al., 2012; Ooi et al., 2012), it is a practically daunting challenge for these PRD-based HKEI firms to compete on operational performances and simultaneously devote substantial resources and attention to more radical product innovation (Eng and Jones, 2009; HKCIEA—Hong Kong Baptist University, 2011; Sun et al., 2012). This is especially true for SMEs without an innovative or entrepreneurial culture (Moreno-Luzon, Gil-Marques and Valls-Pasola, 2013; Plambeck, 2012). As the electronics industry is a rapidly changing sector, typified by a short product life cycle, incumbents in the PRD have to constantly offer new products for market acceptance (Lee, Trimi and Kin, 2013).

Nevertheless, there are conditions still helpful to incumbent firms' new product development. As many PRD electronics firms have implemented QMP and related operations management practices (Daniel, Lee and Reitsperger, 2014; Lai, Yeung and Cheng, 2012; So and Sun, 2010), they are able to build closer ties with value chain partners, a requirement expected of well implemented QM and supply chain systems (Oakland, 2014; So and Sun, 2010). In this way, formal and informal communication channels among chain partners are developed (Fu et al., 2013). Research indicates that these inter-firm ties benefit PRD electronic firms' adaptability in two ways (Fu et al., 2013).

One benefit comes from interactive learning among value chain partners (Fu, Diez and Schiller, 2013; Shou et al., 2014). Complemented with the Chinese tradition of informal business fraternity or *guanxi* (Bu and Roy, 2013), value chain partners exchange the latest information and viewpoints about industry conditions. This includes input on market demands, technological development and policy changes which otherwise these firms may not aware of (Chen, Ellinger and Tian, 2011; Cui 2013; Fu et al., 2013; Wu, 2011). As a result of these formal and informal communication networks, firms heighten their readiness for impending competition (Eng, 2009; Prodi, 2012; Zhou et al., 2011). Second and more importantly, these firms often receive insights, recommendations and suggestions from business partners for new product development (Eng, 2009; Fu et al., 2013; Lau et al., 2011b). These sources of innovation are ideally suited for the practice of modular product modifications found in many electronic products (Lau, 2011a; Fu et al., 2013).

Modular product design refers to the modification and upgrading of existing products by inserting more advanced components/subsystems, while keeping the product architecture largely unchanged (Lau 2011b; Sanchez and Mahoney, 1996). An example of modular product improvement is the upgrading of microprocessors of personal computers. In other words, electronic firms in the PRD are able to incrementally modify or upgrade existing products through plugging the latest off-the-shelf components into their own or reverse-engineered product platforms to keep up with competitive pressures (Fu et al. 2013; Lau, Yam and Tang, 2012; Prodi, 2012). Moreover, modular product modification has always been popular in QM firms, as a "designing for product quality" technique worldwide since the 1980s (Booker 2003 & 2012). So QM firms in the PRD will find its adoption compatible and synergistic with their existing QMP platforms and principles (Juran and Defoe, 2010; Oakland 2014). In other words, under competitive environment, HKEI firms are more inclined to engage in exploitative NPD practices rather than new product exploration. Hence:

Hypothesis 2c: The positive relationship between the firm's quality management practices and its product innovation performance is weakened by competition intensity.

In summary, electronics firms with QMP are well connected by formal and informal interactive learning networks in the PRD (Eng, 2009; Fu et al., 2013; Vanichchinchai and Igel, 2011). Faced with intensified competition, these PRD QM firms see themselves best positioned to compete on operational performances and incremental technological evolution (Lau et al., 2011a; Wong, Ng and Tan, 2012; Zu and Kaynak, 2012). So they see little need to embrace high risks and substantial resource commitment (Fu et al., 2013; Lau et al., 2012). This is not to deny the fact that there are QM firms actively engaging in internal product innovation while operating in the PRD, however the motivation for these cases is largely a result of endogenous drivers such as the vision of the owner or top management (Block, Thurik and Zhou, 2013; Petti and Zhang, 2011; Phan, Zhou and Abrahamson, 2013).

The conceptual model of this research that summarizes the hypotheses is illustrated in Figure 2.3.

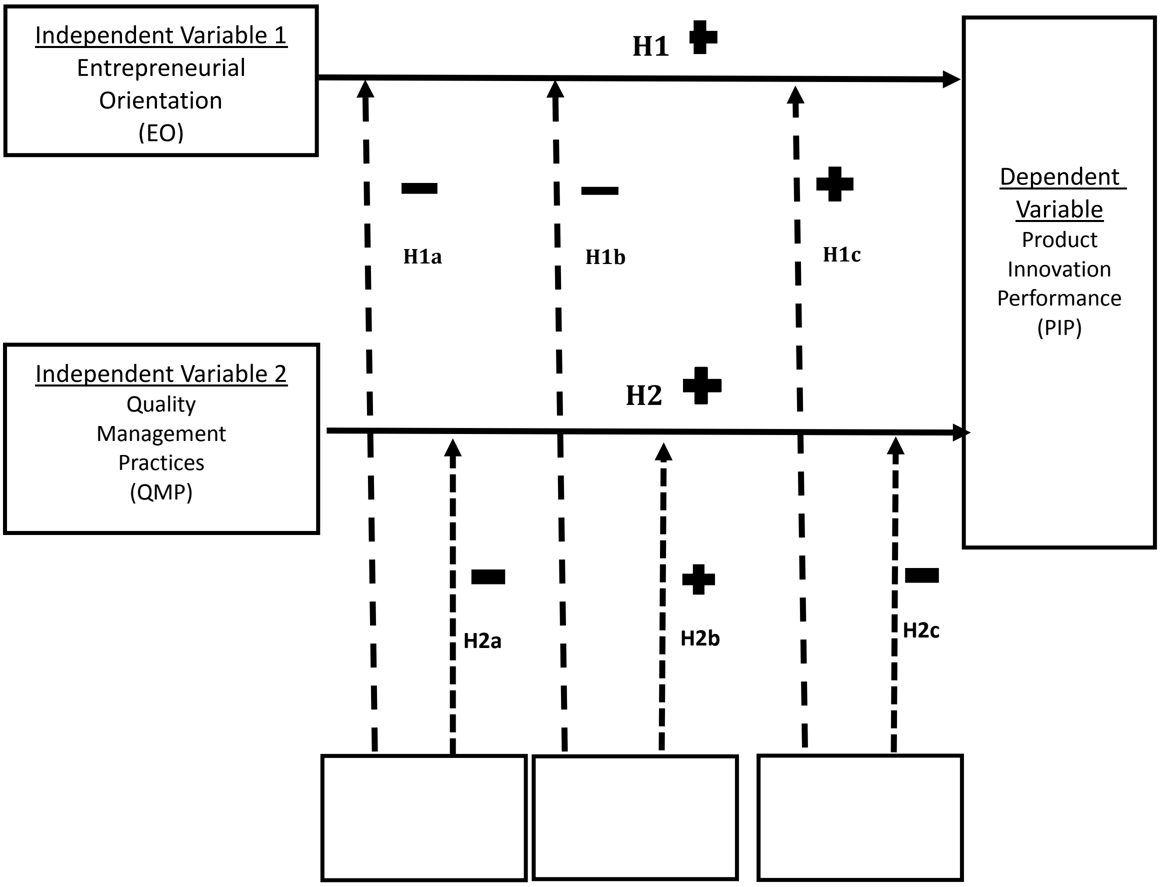

Figure 2.3 Conceptual model of this research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

As with the previous chapter, this chapter begins with an introduction to the research paradigm of this study, and introduction to the research framework, together with an operational definition of its constructs and variables.

Next, the research hypotheses and their underlying assumptions are developed subsequently. Following this is a description of the process of questionnaire design and refinement, together with an explanation of the rationale behind the instrument's choice of dimensions and items.

In the next section, practical issues and theoretical considerations of the sampling method, as well as procedures of conducting the preliminary and full surveys are detailed. Issues of validity and reliability of the data collected are the foci, and measures for ensuring the data's validities and reliability are introduced.

Principles, assumptions and appropriateness of the chosen analytical methodology are discussed and justified in the next section. The major analytical technique selected for model building and hypotheses testing was Structural Equation Modelling (SEM), and an overview of the procedures is also provided in the last section of the chapter.

3.2 Research Approach

3.2.1 Research Paradigms

A research paradigm is the worldview from which a researcher interprets the phenomenon being studied. This worldview of the researcher essentially sets boundaries to one's perception on reality and expectations of how the investigation and its outcomes ought to be (Guba and Lincoln, 2005). A research paradigm thus creates an influence on an investigator's choice of research method and design (Guba and Lincoln, 2005). The two distinctive paradigms in social science research are the empirical-positivist approach and the qualitative-phenomenological approach (Miller and Salkland, 2002). Under these two paradigms, researchers have to take different stances in research designs and approaches to ontology and epistemology (Guba and Lincoln, 1994).

The empirical researcher applies the scientific method to the investigation of the phenomenon of interest and social research should be conducted in a similar manner pertinent to that used by natural scientists (Popper, 1952; Maxwell and Delaney, 2004; Schrag, 1994). An important doctrine under this school of paradigm is that observable and measurable phenomena are realities and empirical researchers must remain emotionally uninvolved, bias-free and remain objective in the course of investigation (Miller and Salkland, 2002). In the conduct of social research and observation, the empirical researcher must also maintain this personal detachment from the people and events, and impartial generalization is drawn from the study of the subjects. The manner of conducting an empirical research includes the adoption of deductive-hypothetic logic, formal scientific writing structure and style, use of jargons and impersonal tone (Miller and Salkland, 2002).

The qualitative school adopts a contrary view of research to the empirical tenets. Qualitative researchers believe that the social world is not one single objective reality and there exists multiple-realities in social phenomena, and researchers cannot make context- and value-free observations, interpretations and generalizations of events as they themselves are involved in the socially constructed phenomenon (Guba and Lincoln, 1989; Lincoln and Guba, 2000; Miller and Salkland, 2002). The way of conducting qualitative research includes rich description of the phenomenon context, use of multiple sources of information and the application of reflexivity in the research process (Collis and Hussey, 2003).

By examining both paradigms, the study follows the deductive-hypothetic approach and its justifications are given in the following section.

3.2.2 Research Approach in this Study

The researcher of this study employed a deductive-hypothetic approach to data collection and analysis for the testing of the research model and its hypotheses. The major premise of this study was that a firm's entrepreneurial orientation and its quality management practices have a positive effect on its product innovation performance. Based on the tenet of empirical research, a hypothesized model was developed from the theories and models in the fields of entrepreneurial-orientation of firms, quality management, product innovation and Chinese management philosophy.

Choice of methodology is guided by the theory being examined. If the theory is well developed and causal directions are clear, and the research is proposing new causal links, the most appropriate method is the hypo-deductive (quantitative) method as is the case in this study (Edmondson & McManus, 2007; Miller and Salkland, 2002).

There were several reasons that this research adopted the quantitative approach. Firstly, this study deals with theories and concepts that are well mature and thus suited to employing a quantitative approach (Edmondson & McManus, 2007). Theories behind the variables in this study are well understood and operationalized. For example, EO and QMP were well researched in the past but calls for renewed studies were made (Covin and Lumpkin, 2011; Covin & Wales, 2012; Dahlgaard-Park et al., 2013; Wales, Gupta and Terry-Mousa, 2011). The editorial of Journal of Operations Management (2011) also called for more cross-disciplinary research on operations management and entrepreneurship as emerging research opportunities (Kickul, Griffiths, Jayaram, & Wagner, 2011).

Secondly, this study aims to answer hypotheses relating existing variables which are well operationalized and measurable, and thus suited for using the quantitiative research approach (Edmondson and McManus, 2007).

Lastly, since the objective of this research model is to expand existing theories to a specific context (HKEI in PRD) and with new boundaries (across the fields between QMP and EO), it also falls within Edmondson and McManus' (2007) criteria for adopting quantitative research to mature theories.

Before testing the hypotheses, a thorough search of the literature was conducted. The process was in line with Hussey and Hussey's advice (1997) that it is pertinent to review the relevant literature first, before the construction of an appropriate theory and related hypotheses. Data were collected from previously validated survey questionnaire scales. The scales used in this research were selected on the basis that they measured the specific constructs, and all these adopted instruments were previously published and validated.

The proposed model is derived from an extensive search and deduction from the related fields of literature. As for fitting to the research objectives of this study, the wording of the construct measurement items were refined with expert supervision and pilot testing as described in detailed in section 3.4.2, when necessary. The instrument was back-translated by experts to ensure its content and face validities. After the pilot testing, reliability of the instrument was evaluated by Cronbach's Alpha Test (Nunnally, 1978).

Data analysis for the research model was carried out using Structural Equation Modelling (SEM) by means of the Analysis of Moment Structures (AMOS 21.0) software package. SEM analysis is a two-stage process that includes: 1) confirmatory factor analysis of the measurement model and 2) maximum likelihood path analysis for testing the hypothesized structural model. For this study, a hypothesized structural model was developed for testing the moderating effects by entering moderators. Post-hoc test of Common Method Variance was also performed.

3.3 Research Framework

3.3.1 Research Model and Variables

As explained in Chapter 1, there are two independent variables and one dependent variable, with three moderating variables in this research. The framework adopted in this study is an integration of existing constructs of Entrepreneurial Orientation (EO) (Lumpkin and Dess, 1996, 1997; Zhou, Yim and Tse, 2005), Quality Management Practices (QMP) (MBNQA, 2011; Prajogo and Sohal, 2004 & 2006; Samson and Terziovski, 1999) and Product Innovation Performance (PIP) (Prajogo and Sohal, 2003). The moderating effects of Market Unfairness (Li and Atuahene-Gima, 2001), Competition Intensity (Auh and Menguc, 2005; Jaworski and Kohli, 1993) and Policy Support (Li and Atuahene-Gima, 2001) on the main model are included. Though the constructs were previously studied, the proposed model is a unique extension for the reasons that 1) it integrates the two different fields of QMP and EO; 2) and with moderating variables that simulate transitional economy external influences.

3.3.2 Operationalization of Variables

The conceptual constructs were operationalized by adapting and modifying validated scales from previous relevant published studies. Reliability, discriminant and convergent validities of the adapted items were validated by the procedures as suggested by Spector (1992, p.47) (result shown in Chapter 4). Table 3.1 shows a summary of the sources of the constructs adopted in this research framework. The following are the operational definition of each of the variables in the framework.

Table 3.1

Constructs and their items of the questionnaire

Construct	Items	α	Source
Entrepreneurial orientation	5 items	.873	Zhou, Yim and Tse (2005); Covin and Slevin (1989)
Quality management practices			
Leadership	4 items	.913	Prajogo and Sohal (2004 & 2006); Samson and Terziovski (1999)
Strategic planning	4 items	.886	Prajogo and Sohal (2004 & 2006); Samson and Terziovski (1999)
Customer focus	6 items	.857	Prajogo and Sohal (2004 & 2006); Samson and Terziovski (1999)
Information and analysis	4 items	.908	Prajogo and Sohal (2004 & 2006);
People management	5 items	.922	Prajogo and Sohal (2004 & 2006); Samson and Terziovski (1999)
Process management	6 items	.865	Prajogo and Sohal (2004 & 2006); Samson and Terziovski (1999)
Market unfairness	4 items	.876	Li and Atuahene-Gima (2001)
Policy support	4 items	.869	Li and Atuahene-Gima (2001)
Competition intensity	6 items	.842	Auh and Menguc (2005) Jaworski and Kohli (1993)

The operationalization of questionnaire items for each variable is described as follows, and all items are measured by 7 point Likert scales.

3.3.2.1 Entrepreneurial Orientation

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, based on the seven-point scale adapted from Zhou, Yim and Tse (2005) which was in turn developed from Covin and Slevin's (1989) scale of EO, with an initial Cronbach's alpha value of .873 and was > .7 threshold for high reliability (Nunnally, 1978) . The following are the items:

Table 3.2

Item descriptions for entrepreneurial orientation

Item code	Item description
Ent_01	We actively build our capacity to react effectively to market changes.
Ent_02	We ensure that our advantages can withstand changes in the industry.
Ent_03	We actively prepare for changes brought by China's 12th Five Year Plan for innovation.
Ent_04	We are ready to face the challenges brought by the environmental-protection demands.
Ent-05	We are ready to face the challenges brought by the emergence of disruptive technologies.

3.3.2.2 Quality Management Practices (QMP)

The definition of this latent construct is derived from the measures conceptualized by Prajogo and Sohal (2004 & 2006) and Samson and Terziovski (1999), which consists of the six dimensions of leadership, strategic planning, customer focus, information analysis, people management and process management. These six variables are also presented as the criteria in the Malcolm Baldrige National Quality Award Model (MBNQA, 2011) and form the basis of a number of Total Quality Management measures adopted by several researchers (Ahire et al. 1995; Dean and Bowen, 1994; Evans and Lindsay, 1999; Samson and Terziovski, 1999). The initial Cronbach's alpha value of the construct was 0.898 and thus was deemed as highly reliable (Nunnally, 1978).

a) Operationalization of Leadership

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, based on the scale adapted from Prajogo and Sohal (2006). Items for Leadership are summarized in Table 3.3. The initial Cronbach's alpha value of the construct was 0.913 and exceeded the 0.7 cut-off value for high reliability (Nunnally, 1978).

Table 3.3

Item descriptions for the dimension of leadership in quality management practices

Item code	Item description
Lead_01	Senior executive s share similar beliefs about the future direction of this company.
Lead_02	Senior managers actively encourage a culture of improvement and innovation by trying new ideas.
Lead_03	Employees are encouraged to help the organization implement changes.
Lead_04	We've eliminated barriers between individuals and departments, with as strong sense of unity here.

b) Operationalization of Strategy Planning

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, was based on the scale adapted from Prajogo and Sohal (2006). Items for Leadership are summarized in Table 3.4. The initial Cronbach's alpha value of the construct was 0.886 and exceeded the 0.7 threshold for high reliability (Nunnally, 1978).

Table 3.4

Item descriptions for the dimension of strategic planning in quality management practices

Item code	Item description
Str_01	Our mission statement is communicated throughout the company and is well supported by staff.
Str_02	Our planning process is comprehensive and structured, with regularly short and long-term reviews.
Str_03	Our plans, policies and objectives always incorporate all stakeholders' needs, including the society's.
Str_04	There is a written statement of strategy for all business operations & is agreed by senior managers.

c) Operationalization of Customer Focus

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, was based on the scale adapted from Prajogo and Sohal (2006). Items for Customer Focus are summarized in Table 3.5. The initial Cronbach's alpha value of the construct was 0.857 and exceeded the 0.7 value for high reliability

(Nunnally, 1978).

Table 3.5

Item descriptions for the dimension of customer focus in quality management practices

Item code	Item description
Cust_01	We actively and regularly seek customer inputs to identify their needs and expectations.
Cust_02	Our customer needs and expectations are effectively disseminated and understood throughout the staff.
Cust_03	We maintain a close relationship with our customers and provide them an easy feedback channel.
Cust_04	We have an effective process for resolving customers' complaints.
Cust_05	We systematically and regularly measure customer satisfaction.

d) Operationalization of Information and Analysis

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, was based on the scale adapted from Prajogo and Sohal (2006). Items for Information and Analysis are summarized in Table 3.6. The initial Cronbach's alpha value of the construct was 0.908 and was greater than the cut-off value of 0.7 for high reliability (Nunnally, 1978).

Table 3.6

Item descriptions for the dimension of information and analysis in quality management practices

Item code	Item description
Info_01	Our Company has an effective performance measurement system to track organizational results.
Info_02	Updated data and information of the company's performance is always readily available for all users.
Info_03	Senior management regularly has performance review meetings and use them for decision making.
Info_04	We actively benchmark our performance against the 'best practice' and our strongest competitors.

e) Operationalization of People Management

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, was based on the scale adapted from Prajogo and Sohal (2006). Items for People Management are summarized in Table 3.7. The initial Cronbach's alpha value of was 0.922, and was deemed reliable as > 0.7 (Nunnally, 1978).

Table 3.7

Item descriptions for the dimension of people management in quality management practices

Item code	Item description
Ppl_01	We have an organization-wide training and personal/career development process for employees.
Ppl_02	Our Company has maintained both 'top-down' and 'bottom-up' communication processes.
Ppl_03	Employee satisfaction is formally and regularly measured.
Ppl_04	Employee flexibility, multi-skilling and training are actively used to improve employee performance.
Ppl_05	We always maintain a work environment that ensures the health, safety and well-being of all staff.

f) Operationalization of Process Management

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, was based on the scale adapted from Prajogo and Sohal (2006). The initial Cronbach's alpha value of the construct was 0.865 and exceeded the 0.7 threshold for high reliability (Nunnally, 1978). Table 3.8 summarizes the items for Process Management:

Table 3.8
Item descriptions for the dimension of process management in quality management practices

Item code	Item description
Prs_01	The concept of 'internal customer' (i.e. the next process down the line) is well understood here.
Prs_02	We design processes in our plant to be 'fool-proof' (preventive-oriented).
Prs_03	We have clear, standardised and documented process instructions which are well followed by all.
Prs_04	We extensively use statistical techniques (e.g. SPC) to improve the processes and to reduce variations.
Prs_05	We strive to establish long-term relationships with suppliers.
Prs_06	We use an on-going supplier rating system to select our suppliers and monitor their performance.

3.3.2.3 Product Innovation Performance

The construct of Product Innovation Performance is conceptualized by Prajogo and Sohal (2003) and others (Avlonitis et al. 1994; Karagozoglu and Brown, 1998; Hollenstein, 1996; Subramanian and Nilakanta, 1996) and is operationalized with the following dimensions: the level of novelty of new products; the use of latest technological innovations in new products; the speed in introducing new products; the number of new products introduced to the market and the number of new products that are first-of-its-kind in the market.

Operationalization of Product Innovation Performance

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, with respect to the industry general level of performance. The scale was based on the scale adapted from Prajogo and Sohal (2006). The initial Cronbach's alpha value of the construct was 0.891, which reflected high reliability of the scale (Nunnally, 1978). Table 3.9 summarizes the items for Product Innovation Performance:

Table 3.9

Item descriptions for product innovation performance

Item code	Item description
PdtInv_01	In terms of level of newness (novelty), our products are the best.
PdtInv_02	We use the latest technological innovations in our new products.
PdtInv_03	In term of new product development, our speed is the fastest.
PdtInv_04	We have the largest number of new products introduced to the market.
PdtInv_05	We have the largest number of first-time-to-the-market new products.

3.3.2.4 Market Unfairness and its Operationalization

This construct is first developed by Li and Atuahene-Gima (2001) and is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, which was based on the scale adapted from Li and Atuahene-Gima (2001). The initial Cronbach's alpha value of the construct was 0.876 and exceeded the 0.7 acceptable threshold for high reliability (Nunnally, 1978). Table 3.10 summarizes the items for Market Unfairness:

Table 3.10

Item descriptions for market unfairness

Item code	Item description
Unfair_01	Unlawful practices such as illegal copying of new products are very common.
Unfair_02	Our products and trade-marks are counterfeited by other firms.
Unfair_03	Legal systems are ineffective to protect your firm's intellectual proprieties.
Unfair_04	There is an increase in unfair competitive practices by other firms in the industry.

3.3.2.5 Policy Support

This construct is taken from the work of Li and Atuahene-Gima (2001) and is conceptualized for measuring the support from government policies and incentives in the innovation of new products. The Chinese government uses a number of policy tools to reward and assist those enterprises that conform to its industrial and economic development planning (Huang and Yang, 2011; Li and Woetzel, 2011). Hong Kong firms can also benefit from some limited assistance from the Hong Kong government in the forms of funding schemes, technical consultations, international trade advices and promotion and loan guarantees (HKSAR Government, 2012).

Operationalization of Policy Support

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree, was based on the scale adapted from Li and Atuahene-Gima (2001). The initial Cronbach's alpha value of the construct was 0.869 and exceeded the 0.7 acceptable value for high reliability (Nunnally, 1978). The following are the items:

Table 3.11

Item descriptions for policy support

Item code	Item description
Support_01	Implemented policies and programmes that have been beneficial to your firm's operations.
Support_02	Provided needed technology information and technical support to your firm.
Support_03	Played a significant role in providing financial support for your firm.
Support_04	Helped your firm to obtain licenses for imports of technology and equipment.

3.3.2.6 Perceived Competition Intensity

This measure is adopted from the studies of Auh and Menguc (2005) and Jaworski and Kohli (1993) for the measurement of perceived intensity of competition experienced by the Hong Kong firms in China.

Operationalization of Perceived Competition Intensity

The construct is measured on a seven-point Likert scale with 1 = totally disagree and 7 = totally agree. The initial Cronbach's alpha value of the construct was 0.842 which exceeded the 0.7 acceptable value for high reliability (Nunnally, 1978). Table 3.12 summarizes the items for Competition Intensity.

Table 3.12

Item descriptions for competition intensity

Item code	Item description
Intens_01	Competition in our industry is cut-throat.
Intens_02	There are many promotion wars in our industry.
Intens_03	Anything that one competitor can offer, others can match easily and quickly.
Intens_04	Price competition is a hallmark of our industry
Intens_05	One hears of a new competitive move almost every day.
Intens_06	Our competitors are relatively strong.

3.4 Questionnaire Design

3.4.1 The rationale of using mail survey

In this study, a survey-based quantitative data collection method was adopted, to obtain data relevant to the research questions and hypotheses. A cross-sectional mail survey method was conducted in the Hong Kong electronic manufacturing sector operating in Southern China. The mail survey method was chosen because this technique is specifically useful for collecting information regarding attitudes and beliefs of the respondents (Cooper and Schindler, 2008; Yin, 1994). In addition, survey technique enables the researcher to examine the characteristics of the sample, as well as to generate conclusions and generalizations from the findings of a sample, to the population concerned. (Cooper and Schindler, 2008). Furthermore, survey method is relatively quick to administer, cost-effective, able to collect large amounts of data over a broad geographic area, and the respondents have the choice to remain anonymous in answering questions (Collis and Hussey, 2003; Cooper and Schindler, 2008; Sekaran, 2009).

The reasons for using postal questionnaire survey rather than the increasing popular email survey are several. First, although online data collection cost is generally lower than the traditional mail counterpart (Wright 2005), the local postages in Hong Kong and nearby Pearl River Delta region are relatively low (A$0.60 per mail including reply postage). Second, from anecdotal accounts and previous studies of response rates in Hong Kong (Tse, 1998), the postal questionnaire response rate is higher than email survey. Third, most Hong Kong companies are bombarded with spam emails and many companies are resistant to unsolicited emails, including surveys. This is one of the possible reasons for the findings of Tse (1998). From anecdotal accounts and studies on Chinese business culture, Chinese managers prefer to be treated with reverence or “face” (mianzi) (Lee, 2005). A properly delivered mail questionnaire, enclosed in a top-grade thick envelope, is a suggestion of the recipient’s social superiority and akin to 'gift-giving' (Qian, Razzaque and Keng, 2007), and thus encourages positive responses. It is for these considerations that mail questionnaires are adopted. Issues and procedures about questionnaire design and sampling strategy are discussed in following sections of this chapter.

3.4.2 Design Process of Questionnaire

In order to encourage responses from the recipients, the questionnaire was designed in a manner that facilitates easy understanding of the questions, and motivates the respondents to complete all the items. Fink (1995, 2003), Zikmund et al. (2012), Cooper and Schindler (2008) and Sekaran (2009) advise the following principles in the development of a respondent-friendly, accurate and efficient survey questionnaire. The following steps were carried out before the finalization of the questionnaire design.

1. **Clear objectives:** The questionnaire was developed with a clear understanding of the objectives, scope, and rationale of this study, and contained questions and items that collected all the information sought in this research (Fink, 1995, 2003).
2. **Integrate findings from past research**: Past studies relevant to the research hypotheses were reviewed for the purpose of identifying items/scales relevant to the constructs in this study. Meanings and definitions of constructs were clarified from the literature for the proper wording of the items for representing each construct (Fink, 1995, 2003).
3. **Compare with similar questionnaires**: The questionnaire design was compared with other previously published questionnaires in studies covering similar constructs and topics. Refinement of the wording and sentence structure were made based on the comparison (Fink, 1995a, 1995b, 2003).
4. **Constructs operationalized with multiple items**: In order to capture the meaning of each construct, multiple items were used to represent the overall concepts and meanings (Fink, 1995a, 1995b, 2003). The use of multiple items for measuring construct also reduces

common method bias caused by single-item measurement (Podsakoff and Organ, 1986).

5. **Back Translation of items by experts:** Although the targeted respondents in the population were professional engineers and managers and many of them had tertiary education background, there was a possibility of invariance of construct measures as many respondents were native Chinese speakers, and the measures adopted were from research published in English (Brislin, 1976; Mullen, 1995). To counter this measurement invariance, the standard back-translation procedure was used (Brislin, 1976; Mullen, 1995). In this study, the original items were translated from English to Chinese by an academic expert who was fluent in both English and Chinese as well as familiar with the fields of this research (Mullen, 1995; Steenkamp and Baumgartner, 1998). Chinese questionnaires were used in the pilot study and survey, with the results back-translated into English for reporting and analysis.
6. **Supervision from experts:** The researcher personally invited academic experts in the fields of quality management, innovation and entrepreneurship for translation and back-translation of items, and for supervising the further refinement of the questionnaire design upon pilot study results (Fink, 1995a, 1995b, 2003).
7. **Pilot studies:** A pilot study (N=40) was conducted to evaluate the reliability and validity of the questionnaire items and constructs (Fink, 1995a, 1995b, 2003). Results of alpha reliability and validty analyses are shown in Table 3.14 and in Chapter 4.

3.4.3 Questionnaire Structure

The questionnaire was organized in two sections. The first section covered the question items for each variable presented in the research model, and respondents answered by seven-point Likert rating ordinal scale and altogether there are 52 items. The second section was for collecting biographical and background information, and the respondents answered by multiple choice, single-response and multiple-response questions. The biographical and background information was collected at the end of the questionnaire to minimize the effect of social desirability and response bias on the variable items (Bowling, 2005). Table 3.13 summarizes the structure and content of the survey questionnaire.

Table 3.13

Structure of the survey instrument

Content	Response type	Number	Analysis
Section A Construct measurement	Likert Scale	52	hypothesis-testing
Section B Background information	Multiple choice single and multiple response scales	8	descriptive statistics

In order to maximize the accuracy of the responses to the specific constructs to be studied, relevant items were selected from published research and modified. The items were checked to ensure that they were composed in brief, clear, straight-forward, active-voice and positive language (Fink, 1995a, 1995b, 2003). Items were also checked for understandability, complexity and the use of jargon. In the event of items with strong emotion, value-laden and double-barrelled structures, items were removed under expert supervision (Cooper and Schindler, 2008; Fink, 1995a, 1995b, 2003; Sekaran, 2009).

The questionnaires were written in plain everyday English, and were intended for technical officers carrying titles such as project managers, production managers, quality managers, R&D managers, chief technology officer or design engineers of the sampled firms. Most recipients were ethnic Chinese, and proper wording was used to avoid cultural- related biases and misunderstanding during back-translation by the experts (Brislin, 1970; Sechrest, Fay and Zaidi, 1972).

3.4.4 Choice of Scale Interval

Likert scales are widely used to measure respondents' attitude, beliefs and opinions, and most Likert scales are either five-point or seven-point (Cooper and Schindler, 2008). The seven-point Likert scale was used in the questionnaire of this study for capturing the attitude of the respondents with respect to the questions asked. The seven-point rating scale was chosen as per previous studies (e.g.: Li, Liu and Zhou, 2006; Lau et al., 2008; Zhou, Yim and Tse, 2005) and because this had shown good construct validity and scale reliability. To maintain consistency of scales, this study used 7-point Likert scales throughout the instrument. The 7-point interval had an advantage in that it reduced the narrow range of responses from Asian respondents, as they tend to exhibit central tendency in surveys (Chen, Lee and Stevenson, 1995). However, as all items used the same interval distance, the amount of bias caused by common method had to be monitored carefully in post hoc tests (Podsakoff and Organ, 2003).

Decisions and justifications regarding research design such as unit of analysis, definition of population and sampling frame, sampling approach and procedures, and survey administration issues are explained in section 3.6.

3.5 Research Subjects and Data Collection

3.5.1 Unit of Analysis

The unit of analysis is the level of investigation of objects in social science research (Zikmund et al., 2012) and typical units of analysis include individuals, groups and social organizations (Miller and Salkland, 2002). The unit of analysis in this study comprised individual firms, specifically Hong Kong electronic manufacturers engaged in both new product development and manufacturing businesses in the seven cities of Guangdong: Shenzhen, Weizhou, Zhuhai, Chungshan, Shunde, Dongguang, and the Greater Guangzhou-Foshan area. These cities are where Hong Kong electronic firms are most concentrated (Meyer, Schiller and Diez, 2009).

3.5.2 Sampling Frame

Sampling is a process by which a certain number of selected subjects are chosen from members of a relevant population (Cooper and Schindler, 2008). In this research, all the electronic product manufacturing companies that met the following criteria were included as eligible members of the population in this study:

1) headquartered in the Hong Kong Special Administrative Region and;
2) actively engage in product development and manufacturing activities in the seven major industrial cities of Shenzhen, Zhuhai, Shunde, Chungshan, Dongguang, the Guangzhou-Foshan metropolitan area and Weizhou in the Pearl River Delta Region of Guangdong province;
3) Companies with an employee size of at least 50 employees each.

Using the above criteria, Hong Kong firms whose main businesses were in Contract

Manufacturing, or Original Equipment Manufacturers (OEM), but without any major product design and development involvement, were excluded from the sampling frame. By the same principles, firms that did not market their own brands, but still involved actively in the design and development of new products (or known as Original Design Manufacturers or ODM) were included in the sampling frame. The sampling frame was based on the following source: the *Annual Directory of Hong Kong Electronic Industry 2011-2012* published by the Hong Kong Electronic Industry Association, supplenmted other business directories for double checking.

For the last criterion, companies with a workforce of under 50 employees were excluded as the vast majority of them were small contractor workshops engaged in OEM activities with little or no NPD activities (HKEIA, 2011).

After considering all three criteria, a total of 3,453 firms were found to be eligible in the two sources and this constituted the population.

3.5.3 Sampling and Data Collection Procedures

3.5.3.1 Pilot Study

Before the launch of a full mail survey, the draft questionnaire was reviewed by a scholar from a university in Hong Kong, who specialized in the fields of operations management, logistics and industrial marketing. With his support, the original scale items were translated from English into Chinese for pilot testing and the subsequent survey. Objectives of the pilot test were to 1) assess the understandability of the questionnaire, and; 2) to ensure respondents could complete the questionnaire in a reasonable time and; 3) to evaluate the reliability of scales.

A small scale pilot test was conducted with 40 engineers/managers enrolled at a local university, in a part-time master degree programme in manufacturing system management. This procedure was considered essential as suggested by Cooper and Schindler (2008) and Fink (1995, 2003) and Sekaran (2009) before the full-scale study was launched. These student-managers were invited on the basis that their employers met the sampling criteria i.e., ODM/own brand companies, conducting NPD in the Pearl River Delta Region and with a workforce size of more than 50 employees). To ensure the 40 responded pilot questionnaires were collected, the researcher obtained the permission and cooperation of the master degree programme's coordinator, teaching staff and the student-participants before the questionnaires were distributed. The internal consistency of the returned responses of the pilot test was assessed using Cronbach's alpha test.

3.5.3.2 Reliability of the Questionnaire

Based on the returned 40 data sets, Cronbach's alpha test was carried out to assess the reliability of the dichotomous scale items used in the pilot study.

Table 3.14

Cronbach's Alpha Coefficient Values for Constructs tested in the Pilot Test

Construct	Cronbach's alpha values
Entrepreneurial Orientation	0.873
Quality Management Practice	0.898
Leadership	0.913
Strategic Planning	0.886
Customer Focus	0.857
Information Analysis	0.908
People Management	0.922
Process Management	0.865
Product Innovation Perforamnce	0.891
Market Unfairness	0.876
Policy Support	0.869
Competition Intensity	0.842

As shown in Table 3.3, all construct items used in the pilot study had Cronbach's alpha values greater than the acceptance threshold of 0.7 and were in the ranges of 0.8 and 0.9. Thus the instrument was considered as having good internal consistency (Nunnally, 1978) and instrument items were then accepted for use in the formal mail survey.

3.5.3.3 Sample Size and Sampling

In social science and business research, the two major categories of sampling techniques are probability sampling and non-probability sampling (Cooper and Schindler, 2008). As it was beyond the resource constraints of the researcher to investigate every firm in the population of interest, sampling was essential in this study. The sampling approach adopted by this study was of random sampling, covering different product categories in HKEI, and cross-sectional in nature.

The rationale of using simple random sampling was that to generate generalizable findings, sample cases need to have an equal probability of representing the population. Simple random sampling permits this representativeness and maximizes generalizability (Sekaran 2009), it was desirable to have a sample that was mathematically representative of the population concerned (Cooper and Schindler, 2008; D Miller and Salkland, 2002; Sekaran, 2009).

Besides the choice of sampling approach, another consideration for sampling procedure was the size of the sample. For the purpose of testing the model with acceptable power and confidence in the results, a sample size of at least 200 is needed (Preacher and Coffman, 2006). By back-calculating, as the estimated response rate of mail surveys was around 7% in Hong Kong (Tse, 1998; Harzing, 1997), at least 2,857 questionnaires needed to be sent out.

Based on the above decisions, 2,857 firms in the sampling frame were sent mail questionnaires in the first wave. Then, after two weeks, reminder postcards were send to the respondents, and then the entire sample were sent questionnaires by mail again in the second wave. The received questionnaires were coded according to their wave for further late and non-response bias tests.

The random selection was carried out by a computer random number generation programme for picking 2,857 firms from a numbered list of 3,453 companies. There was a practical reason for this decision. According to practical experience, some companies listed on the directories could not be contacted due to termination of business and change of address, so a larger number of questionnaires were needed for circulation to compensate for the potential non-contacts.

The nature of business of the 2,857 sampled companies fell into the following categories:

- Biomedical and diagnostic equipment
- Internet, mobile phone and telecommunications equipment
- Energy--saving and –efficient consumer electronics and lightings
- Semiconductor chips and circuit broads
- Electronic measurement and testing equipment
- Computer peripheral devices
- Electrical machinery and related components
- Electronic components and subassemblies
- Consumer electronic appliances

Since 222 survey responses were finally received, the model had the sufficient sample size to be tested with structural equation modelling (SEM) as postulated by different scholars (Kiling, 1998; Loehlin, 1992; Mueller, 1997; Rigdon, 2005; Schumacker and Lomax, 1996) for reliable SEM outcomes.

3.5.3.4 Survey Administration Procedures

The survey was conducted in one phase only, and during the period of September 2011 to May 2012. A total of 274 responses were received. The 2,857 companies were contacted through local mail to their registered Hong Kong office addresses. Managers or personnel were personally addressed in the survey packages to elicit their response. In order to motivate participation, the respondents were offered with an option of receiving a complimentary research summary report by attaching a reply slip to the returned questionnaire (Cooper and Schindler, 2008) in a self-addressed stamped return envelope enclosed within the package.

Of the total number of firms contacted, 52 companies were ineligible for reasons such as company policy of non-participation in unsolicited surveys, change of company business and out of business. Therefore, 222 companies were eligible and provided all the necessary data. The overall response rate for the survey was 10.6% (274 / 2857) and the effective rate was 7.8% (222 / 2857). This response rate was acceptable as it was at the same level of 7% as indicated by Harzing (1997) and Tse (1998). Due to data collection limitations, the collection was conducted only in one phase.
Issues and measures concerning data quality of the received sample such as sample representativeness (Goetz, Tyler and Cook, 1984; Stierand and Dorfler, 2011), common method bias (Podsakoff, MacKenzie and Lee, 2003) and non-response bias (Sheikh and Mattingly, 1981) are discussed in Section 3.7 on research data quality.

3.5.3.5 Ethical Considerations for Data Handling

In this research, ethical issues were taken seriously during the overall research process. In order to meet the required ethical standard and practices of Macquarie University Human Research Ethics Committee, ethics approval was obtained before the commencement of this research project. The chief investigator (the supervisor) and the researcher adhered faithfully to the guidelines as stipulated by the ethics approval form and by the Committee.

While ethical standards vary across individuals, situations, groups and culture (Busher 2002), Cohen et al. (2000) suggest that researchers need to exercise prudence when striking a balance between the pursuit of knowledge and the protection of research subjects' rights and interests. The research proposal and sample instruments and items were scrutinized and approved prior to the launch of the study. The issues of participants' consent in the research, protection of individuals' privacy, and the confidentiality and integrity of the information were seriously considered (Cohen et al., 2000; Denier and Crandall, 1978).

In relation to consent, each recipient of the survey instrument received a written declaration form for confirming individual's consent to participate in the research. The purpose of the study, the confidentiality and use of the information, and the participant's rights were all clearly stated on the form. Respondents were reminded and requested to return the completed survey questionnaires with the signed consent declaration forms.

To ensure the privacy and confidentiality of the respondents, the information they provided was assessable by the researcher only, and the sources of all returned questionnaires and materials were not identifiable by any others. Data files and documents handled in the research did not contain any private information or identities of participants, and all computer files were encrypted and locked by passwords. Hardcopies, print-outs and manuscripts of this project were always locked in a cabinet when not in use. Once the data collection procedures had been completed, the full list of companies in the sampling frame was immediately destroyed and disposed of.

In the cases where some respondents requested a complimentary research summary report, they were instructed to return a reply slip, on which only a non-company, non-confidential personal email address (such as a gmail address) was required for their receipt of the report soft copy. The reply slips were safely kept in a locked cabinet and were not used for other purposes. Once the reports were sent at the completion of the study, the reply slips were shredded and disposed of.

During the research process, the researcher only contacted the participants during the survey, and finally sending summary reports to a handful of participants.

3.6 Validity and Data Quality

3.6.1 Validity of Data

Validity and reliability of outcomes are the benchmarks of a well-designed and conducted research project (Cooper and Schindler, 2008; Sekaran, 2009). Cooper and Schindler (2008) describe validity as the extent that a measurement truthfully represents the value of an object being measured.

Similarly, when a construct is measured and represented by multiple items, validity is the extent that the measurement indicators reflect the construct of interest (Cooper and Schindler, 2008; Hair et al. 2010). In evaluating the truthfulness of survey instruments, internal validity, external validity, convergent validity and discriminant validity are commonly assessed (Hair et. al., 2010).

3.6.1.1 External Validity

External validity refers to the extent of generalizability of the causal relationships of an investigation (Yin, 1994). In other words, external validity is concerned about the extent that the findings are generalizable to other subjects or groups, such as other Hong Kong manufacturing industries or other regions of China. Through the use of a representative sample covering the major industrial clusters in a prominent manufacturing region in China, the external validity of this thesis was achieved.

3.6.1.2 Construct Validity

Construct validity refers to the degree that operationalization of a construct is reflecting the actual meanings and concepts of the construct. In other words, construct validity of a measurement scale is dependent on both sound operational definition and theoretical understanding of a latent construct (Arino, 2003; Cronbach and Meehl, 1955; Hair et al., 2010). In research involving latent variables (Byrne, 2010), construct validity of the measurement scales is assessed before the formal adoption of the instrument (Spector, 1992). It has two parts: convergent validity and discriminant validity

3.6.1.3 Convergent validity

Convergent validity refers to the extent a measurement scale correlates with other measures of the same construct (Hair et. al., 2010), and is evaluated by examining the Confirmatory Factor Analysis (CFA) outputs. Convergent validity is assessed by three measures: 1) factor loadings; 2) average variance extracted (AVE) and composite reliability (CR); 3) Cronbach alpha reliability. Convergent validity is considered as satisfactory when the value of standardized factor loadings of a factor are at least 0.70 (Hair et al., 2010), which means the indicators (after deletion) are highly loaded on one factor and indicated convergence.

Alternatively, a construct's convergent validity is assessable by its AVE value. An AVE value of >0.50 indicates that the construct items account for more than 50% of the variance, other than measurement error variance (Fornell and Larcker, 1981). Hair et al., (2010) also suggesting that CR > 0.70 is an indication that construct reliability is adequate which, in turn, suggests high internal consistency and convergence validity (Hair et al., 2010). Lastly, Cronbach alpha also measures items' internal consistency with a cut-off value of 0.70; values of 0.70 also suggests convergence among the construct items (Hair et al., 2010).

In this study, all constructs had AVE above 0.50, CR and Cronbach alpha values exceeded 0.70, with all standardized loadings above 0.70. Thus there was evidence that convergent validity was adequate for all constructs. The results were reported in Section 4.5.2 (Table 4.14) in Chapter 4.

3.6.1.4 Discriminant Validity

Discriminant validity refers to the extent that a latent construct is unrelated to other latent constructs (Hair et. al., 2010). In other words, a test for a construct should be highly uncorrelated to other tests for other theoretical constructs (Campbell and Fiske, 1959). Using AMOS's CFA output report "Estimates—Correlations", the AVE and Squared Inter-Construct Correlation of all construct-pairs were examined. For a particular construct, if the AVE value was larger than the SIC (Squared Inter-Construct Correlation) with other factors, it suggested that the indicators were more in common with the associated construct than with other constructs (Byrne, 2010). This is recommended by Hair et. al., (2010) as the preferred method of testing, and was also the measure of discriminant validity in this study.

3.6.1.5 Face validity

Face validity is the extent that a set of measurement items fully capture the different characteristics or qualities of a construct (Arino, 2003, Hair at al., 2010). By reviewing previous similar studies involving a construct, and by seeking consultation from experts and the definitive literature, a 'full picture' of the construct emerges, and enables its content to be thoroughly operationalized into measurement items (Arino, 2003). Face and content validity were not an issue in this study for two reasons: 1) this study adopted previously validated scales and; 2) a context-specific pilot test had been conducted.

3.6.2 Common Method Variance

Since this research is based on a self-administered survey using subjective measures, validity of its results is threatened by common method variance. Common method bias or common method variance (CMV) is a type of systematic error that is shared among variables measured and is attributed to the measurement method rather than the constructs being measured (Podsakoff et al., 2003). Podsakoff et al. (2003) suggest that with common method bias, affected studies suffer from false correlations and thus produce misleading conclusions. In other words, it is a kind of false internal consistency due to a common source, context or method.

A Harman single factor test was used to evaluate CMV. This test utilized principal component analysis of exploratory factor analysis (EFA) to examine the total variance extracted due to the existence of common method (Chang, van Witteloostuijn and Eden, 2010). In this test, a latent factor, representing common method effect was first inserted into the AMOS CFA measurement model, and regressed it to all observable variables. Then the factor loadings from the model with latent common factor were compared with those of the original model without the common factor. The factor should be constrained and its R^2 explains the total variance explained by the common variance. If the differences between the two sets of factor loadings were less than the value of 2.0, common method effect was deemed as a serious threat to the suggested model (Brown, 2006; Podsakoff et al., 2003). The analysis revealed that common method bias was negligible and the results were reported in Section 4.5.3 of Chapter 4.

3.6.3 Detecting non-response bias and late-response bias

Another common type of data quality problem comes from the lack of representativeness of the sample drawn (Goetz, Tyler and Cook, 1984). While the sample was drawn randomly, there is still a risk that received responses may contain biases. One bias common in surveys is non-response bias, where the respondents answer the questionnaire significantly differently from those in the population not responding to the survey (Fink, 1995 & 2003). Another bias common in surveys is late response bias, where early respondents give significantly different responses to the items than those late in returning the completed questionnaires (Fink, 1995 & 2003).

To verify the impact of these two biases on sample representativeness, the advice of Armstrong and Overton (1977) was adopted. According to Armstrong and Overton (1977), respondents who failed to reply were more likely to delay their response, thus a wave analysis was used to detect sampling bias. The received 222 responses were split into two groups according to their return dates, one being the early returns and the other group being the late returns. An independent-samples t-test was then performed on the two groups of responses to verify whether there is any significant difference between the two groups on firm size. The result was reported in Section 4.2.2 of Chapter 4 and showed that there was no significant difference between the two respondent groups. Whenever t-test results have a p-value greater than 0.05, it indicates that there is an absence of differences between late and early respondents, thus sampling bias is not serious (Chang and Krosnick, 2009; Cook, Heath and Thompson, 2000).

3.7 Data Analysis Method and Procedures

In this section, justification of using SEM, the approach to data screening and purification and SEM procedures taken are discussed and explained.

3.7.1 Justifications of using Structural Equation Modelling (SEM)

Structural equation modelling (SEM) is a powerful and elegant multivariate analytical technique that combines multiple regression, path analysis and factor analysis, and is able to examine multiple relationships (hypotheses) among the independent and dependent latent variables in a model simultaneously (Kline, 2011; Hair et. al., 2006). Another feature of SEM is that it enables researchers to examine the validity and reliability of the latent variables (Hair et. al., 2010). In sum, SEM involves two procedures: the development of a measurement model and the evaluation of the proposed model. The assumptions and purposes of these procedures are discussed in the next section (Kline, 2011).

The reasons for using SEM as the major analytical technique are as follows. First, the proposed research model in this study involves multiple relationships between independent—dependent variables, and latent/unobservable variables such as ‘quality management practices’ and ‘entrepreneurial orientation’ existing in these relationships/hypotheses. As multiple regression technique is unable to handle latent variables, an alternative technique is needed (Hair et. al., 2010). SEM is specially developed to handle both observed and latent variables, and is a preferable choice of technique for this study (Byrne, 2010; Hair et al., 2006; Kline, 2011).

Second, multiple regression techniques cannot estimate or correct the errors of measured variables operationalized by multiple items (Byrne, 2010; TA Brown, 2006). Regression techniques assume that errors in the explanatory/independent variables vanish, thus if applying these techniques when measurement errors exist in these variables, the resultant inference is liable to serious inaccuracies (Brown, 2006; Kline, 2011; Hair et al., 2006).

Third, there are no known easier or more efficient techniques for modelling multivariate relationships and theory testing than SEM (Byrne, 2010; Hair et al., 2006). Indeed, SEM is a technique specific for confirmatory/inferential purposes rather than exploratory (Brown, 2006; Byrne, 2010), and thus is most appropriate for this study involving multiple causal relationships that were hypothesized in the research model.

3.7.2 Data Screening and Purification

Before conducting any SEM analysis, data had to be screened and analysed for meeting SEM's data requirements. These were: 1) multivariate normality distribution of data; 2) absence of serious outliers; 3) linearity between endogenous and exogenous variables and completeness of data (Hair et. al., 2010). Procedures were conducted to examine the presence of outliers, normality and missing cases in the dataset.

Univariate normality was examined as a prerequisite for multivariate normality. Univariate normality, kurtosis and skewness were assessed by critical values as reported in AMOS 21.0 normality test output for meeting general assumptions of statistical inference (Hair et. al., 2010). Critical ratio values for skewness exceed an absolute value of 3.0 and critical ratio values for kurtosis between 10 and 20 indicate the presence of non-normality (Kline 2011).

Multivariate normality was examined by AMOS' assessing normality output information, specifically by observing the multivariate kurtosis value (Mardia's Coefficient) with a critical ratio less than an absolute value of 3.0 (Yuan, Marshall and Bentler, 2002). "Bollen-Stein" bootstrapping procedure was used to detect non-normal data (Byrne, 2010).

Multivariate outliers were detected by looking at Mahalanobis d^2 distance across all cases, with cases highest in d^2 identified as outliers (Byrne, 2010). If the number of outliers were present, then full measurement model was then tested with and without the outliers, if the differences in model fit between the two tests were not considerable, then the outliers were not threats to the model's validity and were allowed to remain in the dataset. Full results were reported in Section 4.4.3 .

3.7.3 Procedures of Structural Equation Modelling

Structural Equation Modelling (SEM) comprises two major steps, the creation and evaluation of the measurement model and the test of the structural model.

In the first step, after the data was screened and cleansed, the full measurement model was constructed to examine the relations between the latent variables and their indicators, and the model was then evaluated by using Confirmatory Factor Analysis (CFA) (Kline, 2011). In evaluating the measurement model, goodness of fit indices were used to assess the overall fit.

Since Quality Management Practices (QMP) was a second order factor made up of six latent variables, CFA was conducted on QMP and its sub-constructs first on an item-by-item basis. After confirming QMP's fitness, a second full measurement model with the second order factor QMP and the other two variables EO and PIP was tested with CFA. Composite reliability, convergent and discriminant validity of the variables were then assessed (Hair, et al., 2010; Kline, 2011).

In the second step, a structural model of hypothesized paths was created. Its fit was assessed using fit statistics, and then path estimates were used to test the hypothesis

(Byrne, 2010; Kline, 2011). The application and interpretation of these model fit criteria are reported fully in Chapter 4. After testing the main model, another model was created to examine moderating effects by inserting interaction terms to the first one.

Findings of all hypothesis testing are summarized at the end of Chapter 4 with a brief comparison between this study's results and previous research findings. Conclusion and discussion of implications are presented in Chapter 5, together with practical recommendations suggested for the Hong Kong Electronic Industry operating in the PRD.

CHAPTER FOUR

ANALYSIS and RESULTS

4.1 Introduction

This chapter presents the results of statistical analysis and is organized into five sections. In the first section, the results of the sampling response bias tests are summarized. Following that, descriptive statistics of the sample are presented; in this section, characteristics and profile of the sample are reported. In the third section, the procedures and results of the second-order confirmatory factor analysis (CFA), pertaining to the measurement models, are reported. The reliability and validity of the measured constructs and tests checking the extent of common method variance are also described in this section. In the fourth section, the structural model tests are presented; the study hypotheses were tested using the structural equation modeling path analysis. In the last section, findings pertaining to the moderation tests done, using structural equation modeling procedures, are summarized; the moderation hypotheses are evaluated in line with the findings.

4.2 Response Rate and Response Bias

4.2.1 Response Rate

Some 2,857 questionnaires were distributed and a total of 274 responses were received from September 2011 to May 2012. Typical respondents were at middle to senior-middle level holding job titles such as 'CEO' (Chief Executive Officer), 'CTO' (Chief Technology Officer), 'project manager', 'engineering director' or general manager. Among the returned questionnaires, 222 were valid; 29 companies refused to participate due to company policy and 23 questionnaires had incomplete data. This gave an overall response rate of 10.6% (274/2,875), and a calibrated response rate of 7.8% (222/2,857). This participation level was consistent with the common level of response rate reported in Hong Kong using the mail survey method (ACB Tse, 1998; Harzing, 1997), but was considerably lower than the international average rate of 35.7% (Baruch and Bolton, 2008).

4.2.2 Response Bias

An independent t-test procedure was conducted to test whether the early and late responders differ and the difference is due to sampling errors. Early responders were defined as those who sent back response by 31st December 2011. The reason for setting the end of 2011 as a cut-off date for classification was that approaching the end of year factories were very busy finalizing order fulfilment, and with the long Chinese New Year factory break (that lasts for 2 weeks in mainland China), responses tended not to be returned during that time.

As shown in Table 4.1, the p-value of greater than 0.05 indicates that there is no statistically significant difference between late and early respondents in firm size,

$t(217) = -.19$, $p = .846$. Therefore it is argued that response bias is not present, or its influence is very small and negligible.

Table 4.1

Independent t-test Results for Late Response Bias (N = 222)

Response Order	*N*	*M*	*SD*	*t*	*df*	Sig.
Early responders	117	5.06	1.09	-.19	217	.846
Late responders	105	5.08	0.87			

Note. Variances were not equal, $p = .010$. Therefore, degrees of freedom were adjusted accordingly.

4.3 Description of Firm Characteristics

4.3.1 Distribution of Firm Sizes

As shown in Table 4.2, among the 222 firms, 47.4% or 117 respondents were companies with less than 500 employees, and 52.6% or 105 respondents were firms with more than 500 employees. This shows the larger companies as well as small and medium enterprises (SMEs) in the electronics industry were all represented in the sample. This was of particular importance because SMEs are the mainstay of the Hong Kong electronics manufacturing industry, comprising nearly 70% of the total population (HKEIA, 2012).

Table 4.2

Frequencies and Percentages for Firm Sizes of Respondents (N = 222)

Number of Employees	Frequencies	Percentages
100 or below	39	17.6
101 to 500	78	35.1
501 to 1000	34	15.3
1001 to 2000	37	16.7
2001 to 5000	17	7.7
5000 to 10000	11	5.0
10001 and over	6	2.7

4.3.2 Profile of Products Developed by Surveyed Firms

The frequencies and percentages for the products developed by the respondents' firms are shown in Table 4.3. Note that respondents were instructed to tick off all the products that their firm produced. The product group with the highest frequency was electronic components (n = 75, 33.8%) followed by computer accessories (n = 67, 30.2%) and telecommunication devices (n = 66, 29.7%). Consumer electronics (n = 59, 26.6%) and IT/computer hardware (n = 53, 23.9%) ranked in the fourth and fifth positions.

On the other hand, less than 20% of surveyed firms reported involvement in more specialized product categories such as electrical and power machinery (n = 31, 14.0%), industrial electronics (n = 29, 13.1%), semiconductors and circuit boards (n = 26, 11.7%), household appliances (n = 25, 11.3%), medical and healthcare equipment (n =20, 9.0%) and testing or measurement equipment (n = 15, 6.8%). One explanation for the relatively low participation of these types of firms is the high resource hurdle for product innovation, especially for SMEs.

Table 4.3

Profile of Products Designed and Developed by Surveyed Firms

Product Group	Frequencies	Percentages
Components	75	33.8
Computer accessories	67	30.2
Telecommunications devices	66	29.7
Consumer electronics	59	26.6
IT and computer hardware	53	23.9
Subassemblies	51	23.0
Electrical and power machinery	31	14.0
Industrial and manufacturing equipment	29	13.1
Semiconductors and circuit boards	26	11.7
Household appliances	25	11.3
Medical and healthcare equipment	20	9.0
Testing and measurement equipment	15	6.8

4.3.3 Reasons for Product Innovation

The frequencies and percentages for the reasons for pursuing product innovation are summarized in Table 4.4. Note that respondents were allowed to report multiple reasons for product innovation. Most respondents cited "adapting to changing customers' requirements" as a major reason for product innovation (n = 163, 75.3%). The second most popular reason was being "engaged in Original Equipment Design (ODM) business" (n = 135, 60.5%). Following this were product innovation for "new market development" (n = 111, 49.5%), "make best use of existing expertise and technology" (n = 99, 44.4%), "extending product lives of declining products" (n = 72, 32.3%); and as directed by "top management's vision and decisions" (n = 67, 30%). The pattern of responses suggests that the motives for product innovation were heavily skewed to customer- and existing market-influenced conditions, while technology-push and strategy-driven considerations generally played a secondary role in this sample. As nearly half of the sample (49.8%) reported "new market development" as a reason for product innovation, the sampled firms also exhibited strong entrepreneurial inclinations. The importance of the roles of demand and entrepreneurship in determining product innovation direction is consistent with the literature (Di Stefano, et al., 2012).

Table 4.4

Profile of Reasons for Pursuing Product Innovation (N = 222)

Reason	Frequencies	Percentages
Adapt to changing customers' requirements	168	75.3
Engaged in Original Equipment Design (ODM) business	135	60.5
New market development		
Make best use of existing expertise and technology	111	49.8
Extend product lives of declining products	99	44.4
Top management's vision and decision	72	32.3
Others	67	30.0
	33	14.9

4.3.4 Opportunities for Operating in China

The responses to opportunities for operating in China are summarized in Table 4.5; respondents were allowed to tick off more than one response. As Table 4.5 suggests "demands from urbanization and rise of the middle class in China" was the most popular response (*n* = 141, 63.2%), followed by "demands from green sectors in the 12-5 Plan" (*n* = 136, 61%). Options relating to improved efficiency or competitiveness were less frequently reported, with "closer cooperation with customers and suppliers in the Pearl River Delta" ranked as third (*n* = 89, 39.9%), "labour cost reduction by relocating to interior provinces" ranked fourth (*n* = 85, 38.1%), and "make use of Hong Kong headquarters' closeness to China" ranked fifth (*n* = 83, 37.2%). Only 42 firms (18.8%) saw "technological cooperation with Chinese institutions" as a business opportunity and 25 respondents (11.2%) cited other unspecified opportunities as promising.

The Hong Kong firms surveyed appeared to have a defensive and cautious approach toward existing resources (i.e., closer supply chain partnerships, cost reduction by relocation, and continued exploitation of Hong Kong as a trading hub). The overall picture again confirms the roles market demand and operations gains play in Hong Kong firms' perception of entrepreneurial opportunities. This result is consistent with the previous section's findings on motives for product innovation.

Table 4.5

Frequencies and Percentages for Opportunities in China (N = 222)

Opportunities	Frequencies	Percentages
Demands from urbanization and rise of middle class in China	141	63.2
Demands from "green sectors" in the 12-5 Plan	136	61.0
Closer cooperation with customers and suppliers in PRD	89	39.9
Labour cost reduction by relocating to interior provinces	85	38.1
Make use of Hong Kong headquarters' closeness to China	83	37.2
Technological cooperation with Chinese institutions	42	18.8
Others	25	11.2

4.3.5 Risks for Operating in China

Table 4.6 describes responses from the surveyed firms on their perceived risks of operating in China. There were nine choices for the respondents to choose from and each respondent was allowed to select one or more options. Among these risks, some were related to market demands and customer relationships, some were related to the policy and enforcement environment, and the rest were related to operational and other issues.

Table 4.6

Frequencies and Percentages for Risks in China

Opportunities	Frequencies	Percentages
Rising operations costs	177	79.4
Downward pressure on price from customers	154	69.1
Increase in competition	132	59.2
Intellectual property protection	114	55.1
Pressure for compliance to stringent policies	98	43.9
Lack of demand from customers	79	35.4
Problems with customers' receivables	77	34.5
Confusing policies	63	28.3
Others	60	26.9

As shown in Table 4.6, the most common risk was "rising operations costs" (*n* = 177, 79.4%), with "downward pressure on price from customers" (*n* = 154, 69.1%) and "increase in competition" (*n* = 132, 59.2%). Increase of factor costs such as labour or land costs and appreciation of the Chinese Yuan, partially explain these top three cited risks; the latter reason especially caused substantial pressure on electronic firms dependent on component imports and led to cost increases. Since 75 (38.8%) and 51 (23%) of surveyed firms reported that components and subassemblies were among their major product offerings (see Table 4.3), rising costs and pressure from their customers to push price down makes sense.

"Intellectual property protection" (*n* = 114, 55.1%), "pressure for compliance to stringent policies" (*n* =98, 43.9%), "lack of demand from customers" (*n* =79, 35.4%), "problems with customers' receivables" (*n* = 77, 34.5%) and 'confusing policies' (*n* =63, 28.3%) were also reported by the respondents. This profile indicates that intellectual property infringement was a moderately serious concern. Policy and enforcement problems were moderately problematic; this was probably due to the high value-added nature of the electronics industry. Only around one-third of firms reported difficulties arising from lack of demand and customer receivables, and this suggests that although competition was fierce, demand conditions were acceptable and trading relationships with customers were tight. Overall, these responses reveal that the operating climate of Hong Kong electronics firms in the PRD was multifaceted and caused by several social-economic and legal-political influences.

4.3.6 Self-Ratings of Firms' Business Prospects

Respondents were asked to indicate their impressions about their firms' business prospects. As shown in Table 4.7, respondents were "confident" (*n* = 41, 18.4%) or "cautiously confident" (*n* = 78, 35%) with a cumulative percentage of 54.1%, and the distribution was slightly tilted toward the optimistic pole of the dichotomy despite the aforementioned external risks.

Table 4.6

Self-Ratings for Firm's Business Prospects

Self-Ratings	Frequencies	Percentages
Confident	14	18.4
Cautiously confident	78	35.0
No strong position	69	30.9
Expect turbulence	27	12.1
Defensive	6	2.7

4.3.7 Types of Quality Management System Adopted by the Surveyed Firms

Respondents were asked to report which type or types of quality management programmes their firms adopted. As shown in Table 4.7, the three most frequently reported practices were: quality control and inspection (*n* = 171), ISO 9000 (*n* = 129), and selective quality improvement techniques (*n* = 112). Thus, integrative and systematic adoption of quality management programmes was less than industry-wide. The most popular systems implemented were: ISO 9000 (n = 129), other standards (n = 101), in-house total quality management (n = 78), ISO 14001 (n = 75), industry-specific standards such as IECQ (n = 68), and Six Sigma (n = 32). In summary, quality management practices were widely applied. Respondents' firms adopted international or industry standards over generic forms of quality management systems such as TQM or Six Sigma. Therefore, quality management practices were applied instrumentally in compliance with institutional demands, and on top of operational or strategic concerns.

Table 4.7

Types of Quality Management Systems Adopted by Respondents' Firms

	Choice							
Type	1st	2nd	3rd	4th	5th	6th	7th	Total
ISO 9001	14	31	25	31	12	10	6	129
In-house TQM	5	15	9	22	13	8	6	78
Six Sigma	2	3	2	7	6	8	4	32
Selective techniques	20	32	18	19	13	6	4	112
ISO 14001	3	14	14	21	9	8	6	75
Industry standards	6	22	12	12	10	2	4	68
QC and inspection	30	65	27	30	10	7	2	171
Other standards	13	34	16	24	9	3	2	101

4.3.8 Experience in Practicing Quality Management Systems

Respondents were asked to indicate their firms' experience in practising quality management. The answers are summarized in Table 4.8 and reveal that the largest percentage of respondents worked in firms with 11 to 15 years of experience (36.5%). The second largest percentage of respondents worked in firms with 6 to 10 years' experience (32.4%) and 28.8% of the sample had experience in quality management of over 16 years. Only 2.3% of firms had experience of less than five years. It thus appears that the respondents worked in firms characterized by advanced maturity (Balbaster Benavent, Cruz Ros & Moreno-Luzon, 2005).

Table 4.8

Frequencies and Percentages for Firm Experience in Practising Quality Management (N =222)

Number of Years' Experience	Frequencies	Percentages
1 to 5	5	2.3
6 to 10	72	32.4
11 to 15	81	36.5
16 to 20	46	20.7
Over 20	18	8.1

4.4 Assumptions of SEM

4.4.1 Missing Values

Since missing values and the pattern of missing values may affect the validity of statistical results, the data was examined for missing values (Kline, 2011). Due to the careful conduct of the survey procedures, however, there were no missing values in the final data set.

4.4.2 Multivariate Normality

Univariate normality was assessed via the skewness and kurtosis critical ratios produced in the AMOS 21.0 package on the full measurement model (without the moderating variables). As Kline (2011) suggests, critical ratios for skewness above an absolute value of three and critical ratios for kurtosis between 10 and 20 indicate non-normality. The findings in Appendix A reveal that 11 variables were highly skewed (although none of the variables had kurtosis problems). Therefore, these outlier variables were transformed via a natural log function (Kline, 2011). Since they were negatively skewed, the items were reflected first; the transformation was applied; then the items were reflected again (Kline, 2011). The critical ratios for skewness for the transformed variables were all below 3.0; thus, these transformed variables were used in subsequent procedures (Yuan, Marshall and Bentler, 2002). Thereafter, multivariate normality was assessed via assessment of Multivariate kurtosis value (Mardia's coefficient) in AMOS 21's normality output of the full measurement model (Appendix A). Since Mardia's coefficient was greater than 3.0 (Yuan, Marshall, Bentler, 2002), non-normal data was treated with the "Bollen-Stine" bootstrap procedure (Byrne, 2010). Using the full measurement model, a sample of 1,000 bootstraps was requested as reported by the software (Appendix B). A thousand bootstrap samples were usable and the model fit better in 1,000 samples. The model was correct at p = .001 (See Appendix B). The distribution of chi-squares was normal and the mean Bollen-Stine chi-square (835.39) was close to 693 (degrees of freedom for the full measurement model). It thus estimated that multivariate normality was not violated.

4.4.3 Multivariate Outliers

Multivariate outliers were detected via the Mahalanobis D^2 values generated by the AMOS 21 package on the full measurement model (see Appendix C). According to Kline (2011), a case is considered a multivariate outlier if the p-value of its D^2 value is less than .001. As shown in Appendix C, the p-value of D^2 for six cases was less than .001. The proposed full measurement model was thus tested with and without the six outliers. As shown in Table 4.9, even though the fit indices of the model without outliers were slightly better, the difference was not considerable and hence the outliers were kept as their influence was deemed to be negligible.

Table 4.9

Fit Indices for the Proposed Measurement Model With and Without Outliers

Index	With Outliers	Without Outliers	Threshold
Chi-square	1273.81	1224.78	
Degrees of freedom	693	693	
Probability level	.00	.00	
Normed chi-square	1.84	1.77	
Goodness of Fit Index (GFI)	.77	.77	>.80
Tucker-Lewis Index (TLI)	.90	.91	>.95
Parsimonious Goodness of Fit Index (PGFI)	.68	.69	>.50
Comparative Fit Index (CFI)	.91	.92	>.95
Root Mean Square Error of Approximation (RMSEA)	.06	.06	<.06
Lower bound 90% confidence interval	.06	.05	<.08
Upper bound 90% confidence interval	.07	.07	<.06
P-close	.00	.00	>.05
Standardized root mean square residual (SRMR)	.05	.05	<.08

4.5 Hypothesis Testing

Confirmatory factor analysis (CFA) procedures were conducted on the measurement models. Goodness of fit of the measurement models was assessed via the fit indices specified in Table 4.10. As per Kline (2011), the primary indices to be reported are the GFI (an absolute fit index), CFI (an incremental fit index), RMSEA (a parsimony-corrected index), and the SRMR (a statistic related to the correlation residuals). Although Kline (2011) notes that the normed chi-square should not be used since there is no statistical or logical rationale to use it, it is nevertheless included since other researchers report it (cf. Rubera & Kirca, 2012; Zhang and Duan, 2010). After the fit of the measurement models was assessed, the structural model was tested. Finally, the moderation hypotheses were tested via a path analysis using the AMOS 21 programme.

Table 4.10

Fit Indices and Their Threshold Values

Index	Threshold	Reference
Normed chi-square	Unclear	Kline, 2011
Goodness of Fit Index (GFI)	> .80	Joreskog & Sorbom, 1993
Tucker-Lewis Index (TLI)	> .95	Hu & Bentler, 1999
Parsimonious Goodness of Fit Index (PGFI)	> .50	Hu & Bentler, 1995
Comparative Fit Index (CFI)	> .95	Hu & Bentler, 1999
Root Mean Square Error of Approximation (RMSEA)	< .06	Brown & Cudeck, 1993
Standardized root mean square residual (SRMR)	< .08	Hu & Bentler, 1999

4.5.1 Results for the QMP Measurement Model

The QMP measurement model was a second-order construct. The second-order construct was hypothesized to be measured by six first-order constructs, as depicted in Figure 4.1. The results for the initial QMP measurement model are summarized in Table 4.11. The model had mediocre fit: value for the GFI, PGFI, and SRMR were above the cut off but values for the TLI, CFI, and RMSEA were not satisfactory. The model was trimmed based on two criteria: only indicator variables with standardized factor loadings above .70 were retained (Hair, et al., 2010); indicator variables with the highest modification indices (MI) were dropped until model fit was acceptable were deleted as this was an indication that the variables were cross-loading onto other constructs (Byrne, 2010). Based on these criteria, several indicator variables were deleted. A list of the deleted items and the reasons for their deletion is displayed in Table 4.12. The fit indices for the final QMP measurement model are shown in Table 4.11 (see also Appendix D). This final model, depicted in Figure 4.1, fits the data well since the criteria for all the indices were met. In addition, the final model fit is significantly better than the initial model, $\Delta\chi^2$ (188) = 444.43, $p < .001$. Further, all indicators loaded on significantly to their respective constructs (as shown in Table 4.17).

Table 4.11

Fit Indices for the Initial and Final QMP Measurement Models

Index	Initial Model	Final Model	Threshold
Chi-square	774.78	330.35	
Degrees of freedom	371	183	
Probability level	.00	.00	
Normed chi-square	2.09	1.81	2
Goodness of Fit Index (GFI)	.80	.87	>.80
Tucker-Lewis Index (TLI)	.90	.95	>.95
Parsimonious Goodness of Fit Index (PGFI)	.68	.69	>.50
Comparative Fit Index (CFI)	.91	.95	>.95
Root Mean Square Error of Approximation (RMSEA)	.07	.06	<.06
Lower bound 90% confidence interval	.06	.05	<.08
Upper bound 90% confidence interval	.08	.07	<.06
P-close	.00	.05	>.05
Standardized root mean square residual (SRMR)	.05	.04	<.08

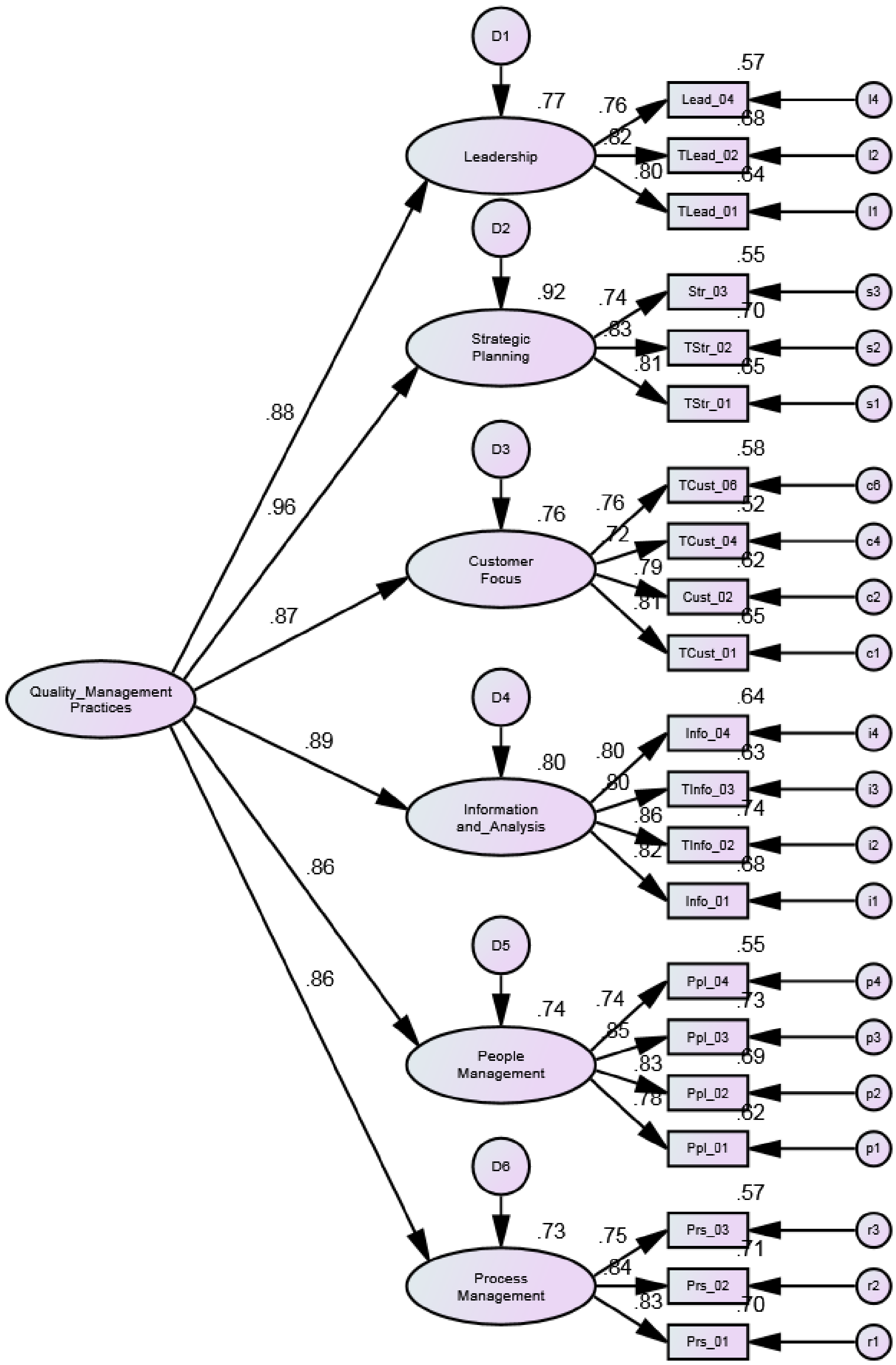

Figure 4.1 Standardized coefficients for the final QMP measurement model.

Table 4.12

Items Deleted from the Initial QMP Measurement Model

Item	SFL/MI
Standardized factor loadings less than .70	
Strategic 4	.69
Customer 3	.66
Process 5	.61
Leadership 3	
Error term of Lead 3 highly correlated with error term of Strategic 3	16.06
Lead 3 loaded onto Strategic 3	7.80
Customer 5	
Error term of Customer 5 highly correlated with error term of Customer 6	11.62
Error term of Customer 5 highly correlated with error term of Customer 1	8.19
People 5	
Error term of People 5 highly correlated with error term of Process 3	10.91
People 5 loaded onto Process 3	9.20
Process 4	
Error term of Process 4 highly correlated with error term of Info 3	6.70
Process 4 loaded onto Info 3	6.62
Process 6	
Error term of Process 6 highly correlated with error term of Process 2	7.24
Error term of Process 6 highly correlated with error term of Information	5.39

Note. SFL = Standardized Factor Loading. MI = Modification Index.

4.5.2 Results for the Full Measurement Model

The full measurement model consisted of the QMP second-order factor and two first-order factors, Entrepreneurial Orientation and Product Performance Innovation. The results for the initial full measurement model are summarized in Table 4.13 (also Appendix E). The model had a close to acceptable fit: criteria for the GFI, PGFI, RMSEA, and SRMR were met, but criteria for the TLI and CFI were not met. But the standardized factor loadings of Entrepreneurial Orientation item 1 and Product Innovation Performance item 4 were not above .70 (Hair, et al., 2010); thus, they were deleted. The final measurement model, depicted in Figure 4.2, fits the data well since the criteria for all the indices were met; the final model fit is significantly better than the initial model, $\Delta\chi^2$ (57) = 147.02, $p < .001$. Further, all indicators loaded on significantly to their respective factors (see Appendix D).

The final model was compared to the alternative first-order measurement model depicted in Figure 4.3. Although this alternative model fit the data well and even better than the proposed full measurement model, $\Delta\chi^2$ (19) = 61.71, $p < .001$, it was proposed in the literature review that QMP consisted of the six constructs depicted in the proposed model. In addition, these six constructs were highly correlated with each other – thus indicating that a second-order QMP factor made theoretical and statistical sense (Kline, 2011: 361-364). Therefore, the proposed final measurement model was used in subsequent structural model tests.

The composite reliability (CR) and the average variance extracted (AVE) were used to measure the convergent validity of the constructs. Constructs have convergent validity when the composite reliability exceeds the criterion of .70 (Hair, et al., 2010) and the average variance extracted is above .50 (Bagozzi, 1994). As shown in Table

4.14, the composite reliability values of all the constructs were above .70. Further, their average variance extracted values were all above .50. Thus, these constructs were deemed as having convergent validity.

Discriminant validity was assessed by comparing the absolute value of the correlations between the constructs and the square root of the average variance extracted by a construct. When correlations are lower than the square root of the average variance extracted by a construct, the constructs are said to have discriminant validity (Fornell & Larcker, 1981). The findings in Table 4.15 reveal that the square roots of the average variance extracted for all the constructs were higher than their correlations with other constructs; thus these constructs had discriminant validity.

Table 4.13

Fit Indices for the Initial and Final Full Measurement Models

Index	Full Model		Alternative	Threshold
	Initial	Final	Model	
Chi-square	715.70	568.68	506.97	
Degrees of freedom	425	368	349	
Probability level	.00	.00	.00	
Normed chi-square	1.68	1.55	1.45	
Goodness of Fit Index (GFI)	.83	.85	.87	>.80
Tucker-Lewis Index (TLI)	.93	.95	.96	>.95
Parsimonious Goodness of Fit Index (PGFI)	.71	.72	.70	>.50
Comparative Fit Index (CFI)	.94	.96	.97	>.95
Root Mean Square Error of Approximation (RMSEA)	.06	.05	.05	<.06
Lower bound 90% confidence interval	.05	.04	.04	<.08
Upper bound 90% confidence interval	.06	.06	.05	<.06
P-close	.10	.52	.82	>.05
Standardized root mean square residual (SRMR)	.05	.05	.04	<.08

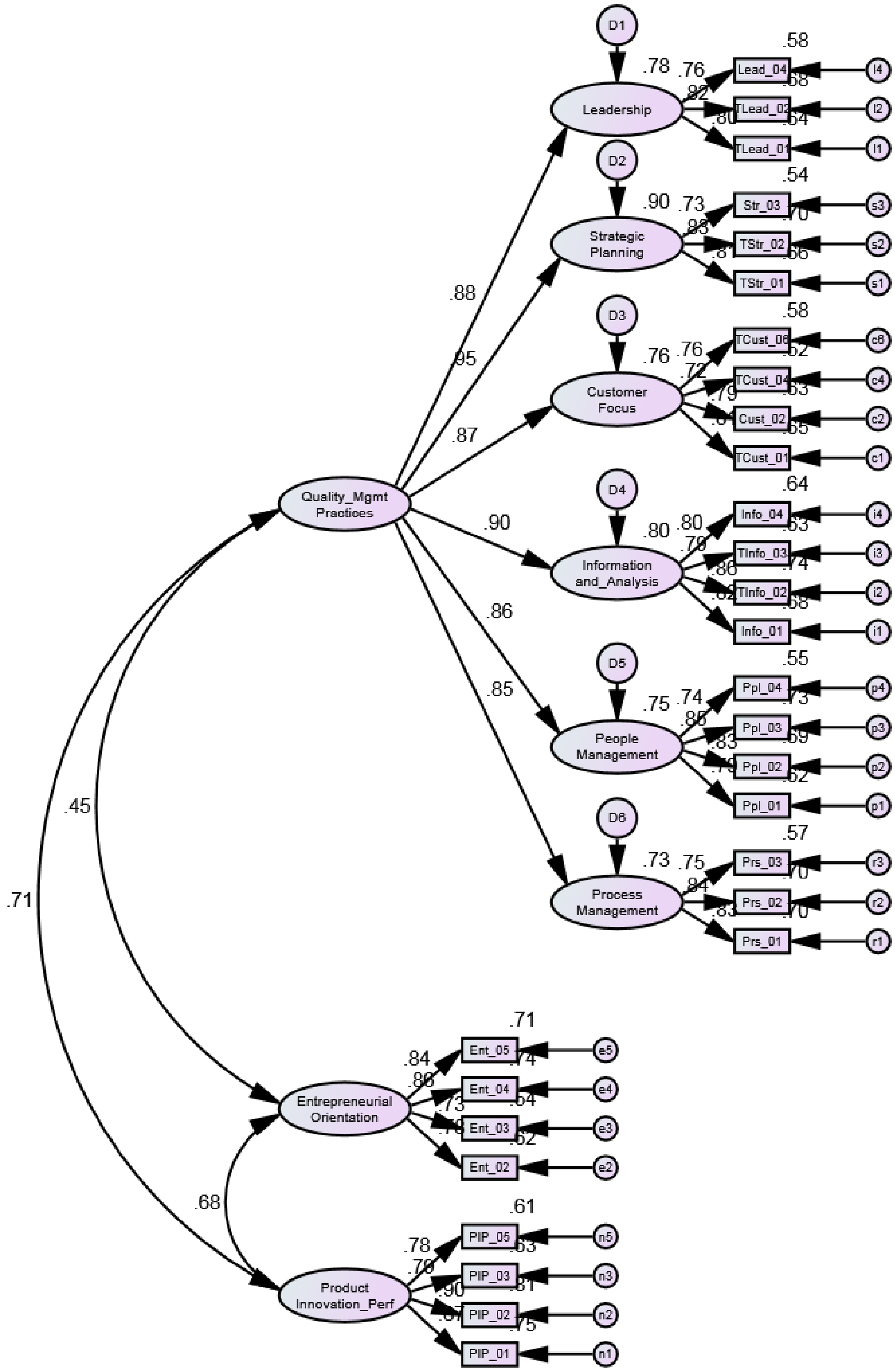

Figure 4.2 Standardized coefficients for the final measurement model.

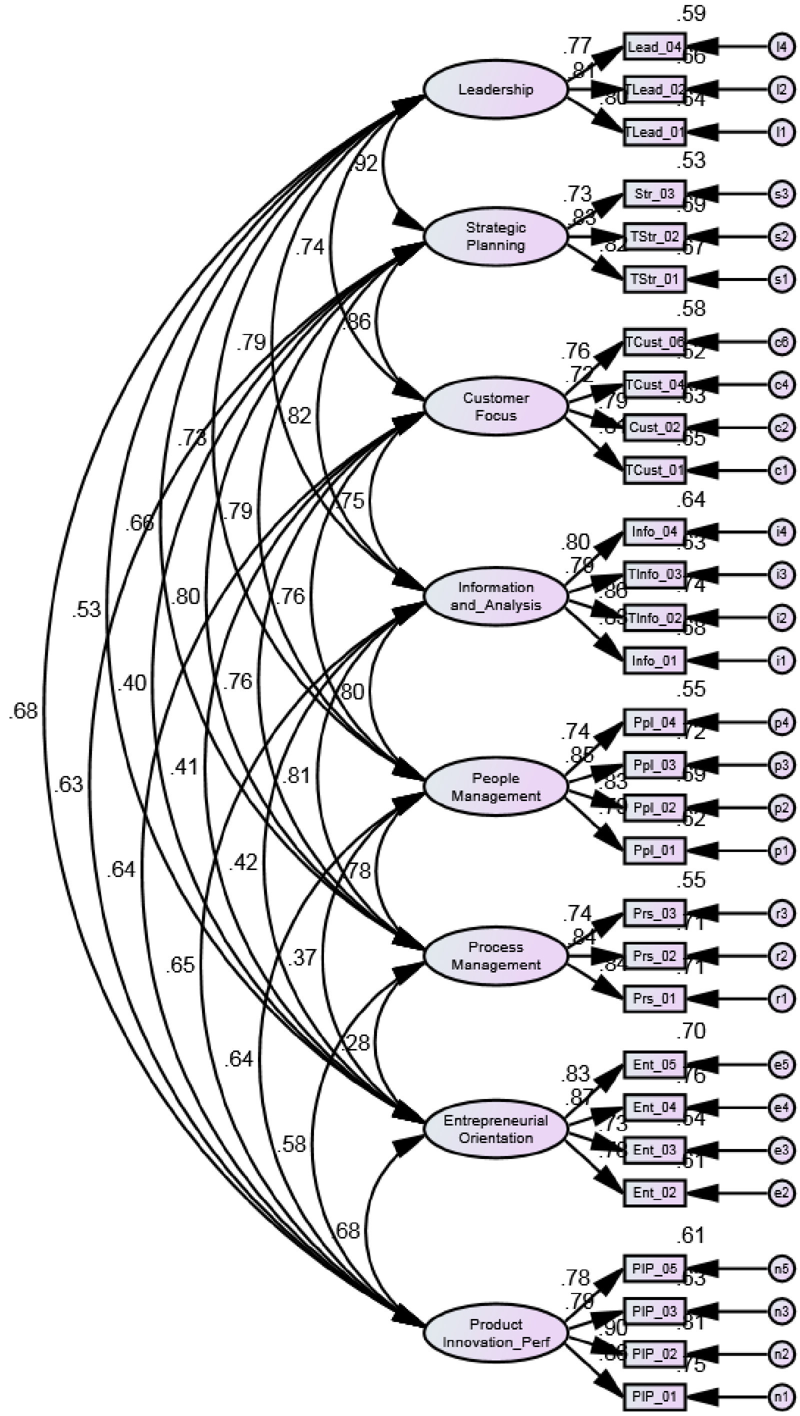

Figure 4.3 Standardized coefficients for the alternative full measurement model.

Table 4.14

Convergent Validity for the Constructs of the Final Measurement Model

Construct	Composite Reliability	Average Variance Extracted
Quality management practices	.96	.79
Entrepreneurial innovation	.88	.69
Product innovation performance	.89	.71

Table 4.15

Discriminant Validity Results for the Final Measurement Model

Construct	1	2	3
1 Quality management practices	.89		
2 Entrepreneurial innovation	.45	.83	
3 Product innovation performance	.71	.68	.84

Note. The values of the square root of the average variance extracted are on the diagonal; all other entries are the correlations. Correlations were statistically significant at .001.

4.5.3 Ad-hoc Analysis: Common Method Variance

4.5.3.1 Harman's single factor test.

Harman's Single Factor Test was conducted to determine whether a single factor accounted for more than 50% of the variance. Thus, using SPSS 21, an exploratory factor analysis was conducted with the 29 items used in the final measurement model. Principal components analysis was used to extract the factors; no rotation procedure was specified. Four factors were extracted (with eigenvalues above one); the first factor accounted for 47.4% of the variance. Since this factor accounted for less than 50% of the variance, common method bias was not a problem.

4.5.3.2 Common latent factor test.

Using the AMOS 21 programme, a measurement model was tested. This model was the final full measurement model with an additional latent construct (i.e., the common latent factor). All indicator variables were made to load onto this common latent factor (per Podsakoff, et al., 2003). Common method bias was assessed by comparing the standardized factor loadings yielded by the measurement model, with the standardized factor loadings yielded by a model with a common latent factor (CLF) (Podsakoff, et al., 2003). Common method bias was assumed to occur when the difference between the loadings was higher than .20 for most items (Billiet and McClendon, 2000).

The measurement model with the common latent factor fit the data well, as shown in Table 4.16. The standardized factor loadings and multiple squared correlations for the model with and without CLF are shown in Table 4.17. The findings in Table 4.17 reveal that the change in standardized factor loadings between models with and without a common latent factor ranged from .02 to .16. Further, the difference in R^2 was also minimal (i.e., differences ranged from .00 to .05). Since the differences in factor loadings were less than .20 and the differences in R^2 were also minimal, common method bias was not deemed to be a major problem (Billiet and McClendon, 2000).

Since the model fits the data well, because the constructs demonstrated convergent and discriminant validity, and because common method bias was not a problem, the final measurement model was used to test the structural model.

Table 4.16

Fit Indices for the Measurement Model with the Common Latent Factor

Index	Value	Threshold
Chi-square	600.74	
Degrees of freedom	367	
Probability level	.00	
Normed chi-square	1.64	
Goodness of Fit Index (GFI)	.84	>.80
Tucker-Lewis Index (TLI)	.94	>.95
Parsimonious Goodness of Fit Index (PGFI)	.71	>.50
Comparative Fit Index (CFI)	.95	>.95
Root Mean Square Error of Approximation (RMSEA)	.05	<.06
Lower bound 90% confidence interval	.05	<.08
Upper bound 90% confidence interval	.06	<.06
P-close	.21	>.05
Standardized root mean square residual (SRMR)	.05	<.08

Table 4.17

Standardized Factor Loadings and Squared Correlations for the Models With and Without a Common Latent Factor

Path	No CLF		With CLF		
	β	R^2	β	CLF β	R^2
Leadership to:					
Lead 4	.80	.57	.70	.32	.60
Lead 2	.80	.68	.70	.33	.69
Lead 1	.78	.64	.68	.34	.64
Strategic planning to:					
Strategy 3	.70	.55	.58	.34	.54
Strategy 2	.82	.70	.72	.34	.70
Strategy 1	.84	.65	.74	.31	.68
Customer focus to:					
Customer 6	.79	.58	.77	.28	.62
Customer 4	.73	.52	.58	.37	.57
Customer 2	.77	.62	.58	.39	.63
Customer 1	.78	.65	.60	.38	.63
Information and analysis to:					
Info 4	.82	.64	.75	.28	.67
Info 3	.76	.63	.66	.35	.61
Info 2	.84	.74	.75	.31	.70
Info 1	.84	.68	.74	.34	.69

Path	No CLF		With CLF		
	β	R^2	β	CLF β	R^2
People management to:					
People 4	.72	.55	.61	.32	.55
People 3	.75	.73	.75	.34	.74
People 2	.84	.69	.73	.34	.69
People 1	.81	.62	.74	.32	.64
Process management to:					
Process 3	.74	.57	.62	.34	.56
Process 2	.84	.71	.78	.30	.74
Process 1	.84	.70	.76	.30	.72
Entrepreneurial orientation to:					
Entrepreneur 5	.83	.71	.71	.36	.71
Entrepreneur 4	.87	.74	.75	.37	.75
Entrepreneur 3	.72	.54	.56	.41	.55
Entrepreneur 2	.79	.62	.64	.37	.61
Product innovation performance to:					
Product 5	.76	.61	.65	.31	.60
Product 3	.76	.63	.60	.37	.63
Product 2	.89	.81	.78	.36	.82
Product 1	.86	.75	.72	.38	.75

Note. CLF = common latent factor.

4.5.4 Results for the Structural Model

The structural model is depicted in Figure 4.4 and its fit indices are presented in Table 4.19 (see also Appendix G). The structural model fit the data well since the criteria for all the indices were met: the RMSEA was low at .05, the SRMR was also low at .05, the TLI was high at .95, the CFI was high at .96, the GFI was high at .85, and the PGFI was high at .72.

As shown in Table 4.18, EO positively predicted PIP, β = .45, $p < .001$. QMP also positively predicted product innovation performance, β = .51, $p < .001$. The percentage of variance accounted for by the PIP construct was 67.1. This indicated that EO and QMP jointly predicted 67 percent of variance in PIP, and both relationships of E0→PIP and QMP→PIP were significantly positive in the moderating factors.

Table 4.18

Unstandardized and Standardized Path Coefficients of the Proposed Structural Model

Path	*B*	*SE*	β	*t*
QMP to PIP	.60	.08	.51	7.12 ***
EO to PIP	.48	.07	.45	7.07 ***

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

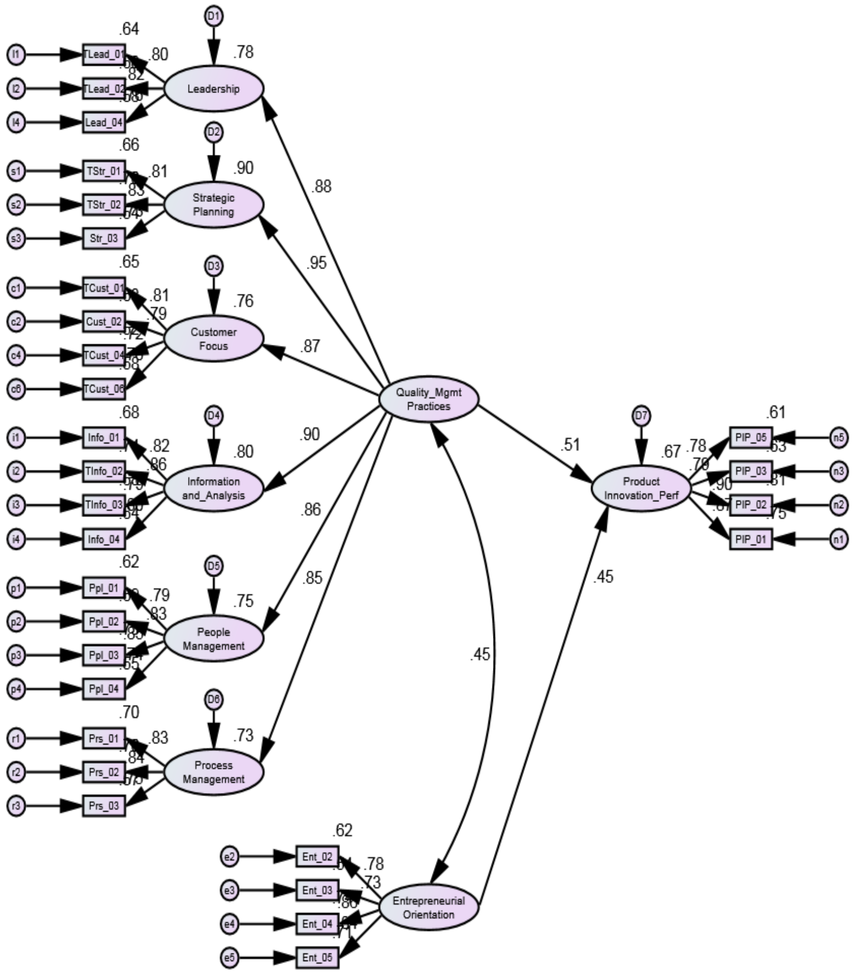

Figure 4.4 Standardized coefficients for the structural model

4.5.4.1 Alternative models.

Anderson and Gerbing (1988) argue that even though "a given model has acceptable goodness of fit, other models with equal fit may exist". Following the suggested procedures of Anderson and Gerbing (1988), the hypothesized structural model was compared to three other models: a null model in which all the hypothesized paths were constrained to zero, an alternative model in which the path between QMP and PIP was constrained to zero, and an alternative model in which the path between EO and PIP was constrained to zero (Anderson and Gerbing, 1988; Kline, 2011:365). The fit indices for these models are summarized in Table 4.19. The findings reveal that the hypothesized model fits better than the null model, $\Delta\chi^2$ (2) = 187.94, $p < .001$. It also fits better than the first alternative model, $\Delta\chi^2$ (1) = 70.75, $p < .001$. Lastly, it fits better than the second alternative model, $\Delta\chi^2$ (1) = 56.46, $p < .001$. Note also that the RMSEA and SRMR of the hypothesized model were lower than the other models and that the GFI, PGFI, TLI, and CFI were higher than the other models. Thus, the hypothesized model fits the data best.

4.5.4.2 Reverse causality

Reverse causality is an important issue in management research using structural equation modeling (Anderson and Gerbing, 1988; Cole and Maxwell, 2003; Kline, 2011), as Anderson and Gerbing (1988) suggest that "temporal order is not an infallible guide to causal relations." For this reason, a model for reverse causality test was created, of which the paths between QMP and PIP and EO and PIP were reversed was assessed (and is depicted in Figure 4.5). Although the best way to rule out reverse causation is to collect longitudinal data (Jonge et al., 2001), testing whether a model with reverse causal links fits the data better than the hypothesized one is one way to examine this issue. As shown in Table 4.19, the reverse causation model fits the data just as well as the hypothesized model, $\Delta\chi^2$ (1) = .54, $p < .975$; therefore, it is technically difficult to rule out the possibility of reverse causation even though it is counterintuitive to existing knowledge in the EO, QM and innovation fields. As Hair et al. (2010) point out, structural equation models must be built on soundly developed theory and knowledge reasoning. Hence the possibility of reverse causation does not necessarily warrant a valid and sensible alternative model.

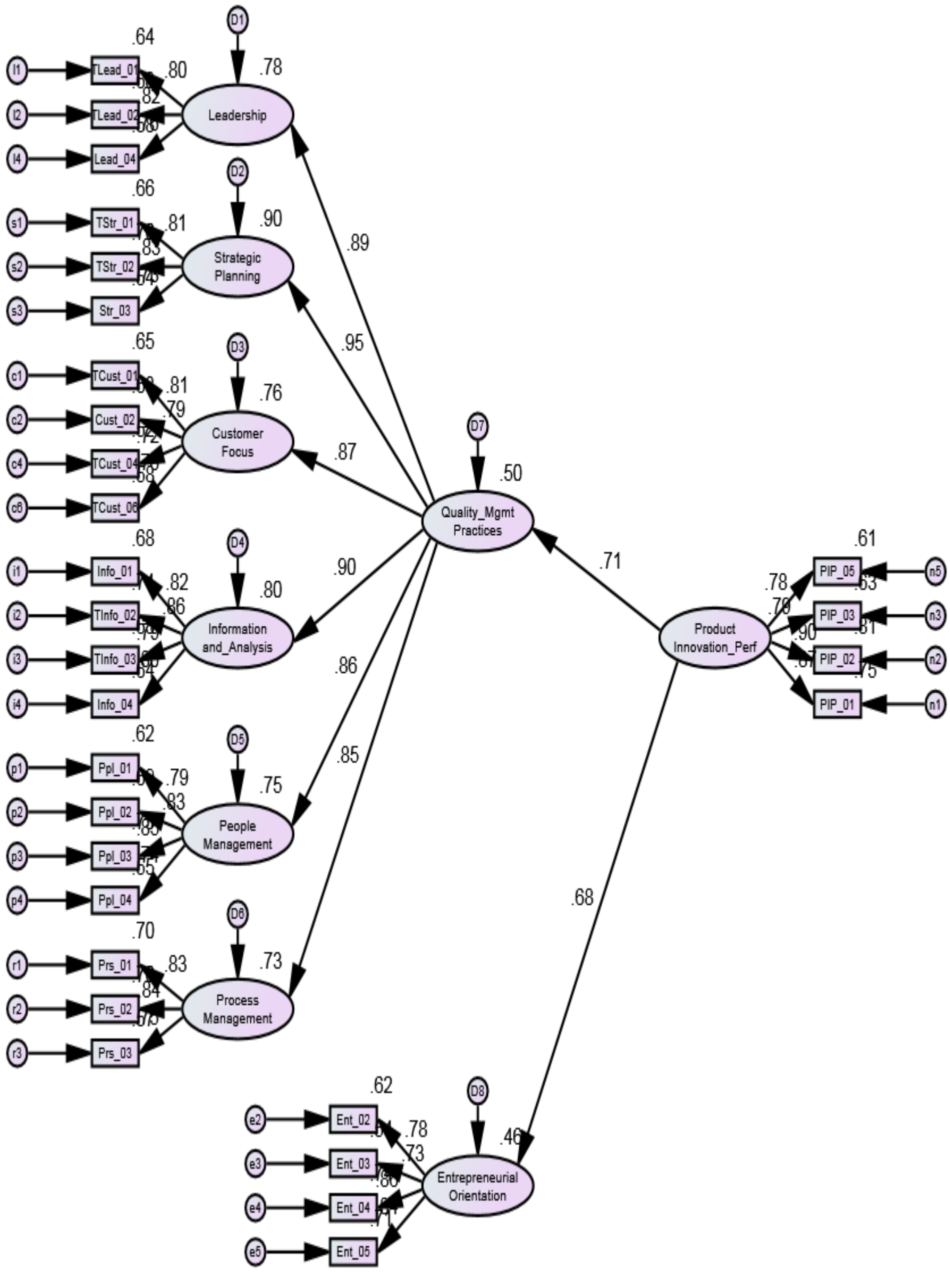

Figure 4.5 Standardized coefficients for the reverse causation model.

Table 4.19

Fit Indices for the Structural, Alternative Nested, and Reverse-Causation Models

Index	Hypothesized Model	Null Model	Alternative One	Alternative Two	Reverse Causation	Threshold
Chi-square	568.68	756.62	639.43	625.14	569.22	
Degrees of freedom	368	370	369	369	369	
Probability level	.00	.00	.00	.00	.00	
Normed chi-square	1.55	2.05	1.73	1.69	1.54	
Goodness of Fit Index (GFI)	.85	.83	.84	.84	.85	>.80
Tucker-Lewis Index (TLI)	.95	.91	.93	.94	.95	>.95
Parsimonious Goodness of Fit Index (PGFI)	.72	.70	.71	.71	.72	>.50
Comparative Fit Index (CFI)	.96	.91	.94	.94	.96	>.95
Root Mean Square Error of Approximation (RMSEA)	.05	.07	.06	.06	.05	<.06
Lower bound 90% confidence interval	.04	.06	.05	.05	.04	<.08
Upper bound 90% confidence interval	.06	.08	.05	.06	.06	<.06
P-close	.52	.00	.01	.10	.53	>.05
Standardized root mean square residual (SRMR)	.05	.21	.11	.06	.05	<.08

4.5.5 Results for the Moderation Analysis

A new measurement model was tested that included the three constructs hypothesized to be moderators. The measurement model had mediocre fit, as shown in Table 4.20. Because fit was mediocre and because a model including the three product terms would be overly complicated, composites were created and the moderator hypotheses were tested via a path analysis.

The path model was created by first calculating the composites of all the variables. Following this, all variables were standardized using the AMOS 21 program. Interaction product terms were then created by multiplying moderators and predictors; these product terms were saved into the data set. Thereafter, the structural model depicted in Figure 4.6 was tested via a path analysis. So as to better understand the statistically significant interaction terms, plots were created.

The findings of the path analysis are summarized in Table 4.21 and reveal that policy support was found to have a negative moderation effect on EO→PIP relationship, $\beta = -.12$, $p = .000$. As illustrated in Figure 4.7, the effect of EO on PIP was strong when policy support was minimal. But the effect of EO→PIP was not very strong when policy support was high.

In addition, perceptions of unfairness moderated the effects of QMP on PIP, $\beta = .09$, $p = .023$. As depicted in Figure 4.8, the effect of QMP on PIP was not as strong when the market was only slightly perceived as unfair. But the effect of QMP on PIP was stronger when the market was perceived as highly unfair.

Table 4.20

Fit Indices for the Measurement Model with Moderators

Index	Values	Threshold
Chi-square	1319.70	
Degrees of freedom	837	
Probability level	.00	
Normed chi-square	1.58	
Goodness of Fit Index (GFI)	.79	>.08
Tucker-Lewis Index (TLI)	.92	>.95
Parsimonious Goodness of Fit Index (PGFI)	.69	>.50
Comparative Fit Index (CFI)	.92	>.95
Root Mean Square Error of Approximation (RMSEA)	.05	<.06
Lower bound 90% confidence interval	.05	<.08
Upper bound 90% confidence interval	.06	<.06
P-close	.36	>.05
Standardized root mean square residual (SRMR)	.06	<.08

Table 4.21

Unstandardized and Standardized Coefficients for the Moderator Model

Path	*B*	*SE*	β	*t*
Quality program management →PIP	.51	.03	.51	14.77 ***
Entrepreneurial orientation → PIP	.50	.03	.49	14.61 ***
Policy support→PIP	.24	.03	.24	8.27 ***
Market unfairness → PIP	.02	.03	.02	.51
Intensity → PIP	-.08	.03	-.08	-2.48 *
Policy support x quality program management →PIP	.01	.03	.01	.35
Policy support x entrepreneurial orientation → PIP	-.12	.04	-.11	-3.42 ***
Market unfairness x quality program management → PIP				
Market unfairness x entrepreneurial orientation → PIP	.08	.04	.09	2.27*
Intensity x quality program management → PIP				
Intensity x entrepreneurial orientation → PIP	-.06	.04	-.06	-1.69
	-.04	.04	-.04	-1.00
	.06	.04	.06	1.65

* $p < .05$. ** $p < .01$. *** $p < .001$.

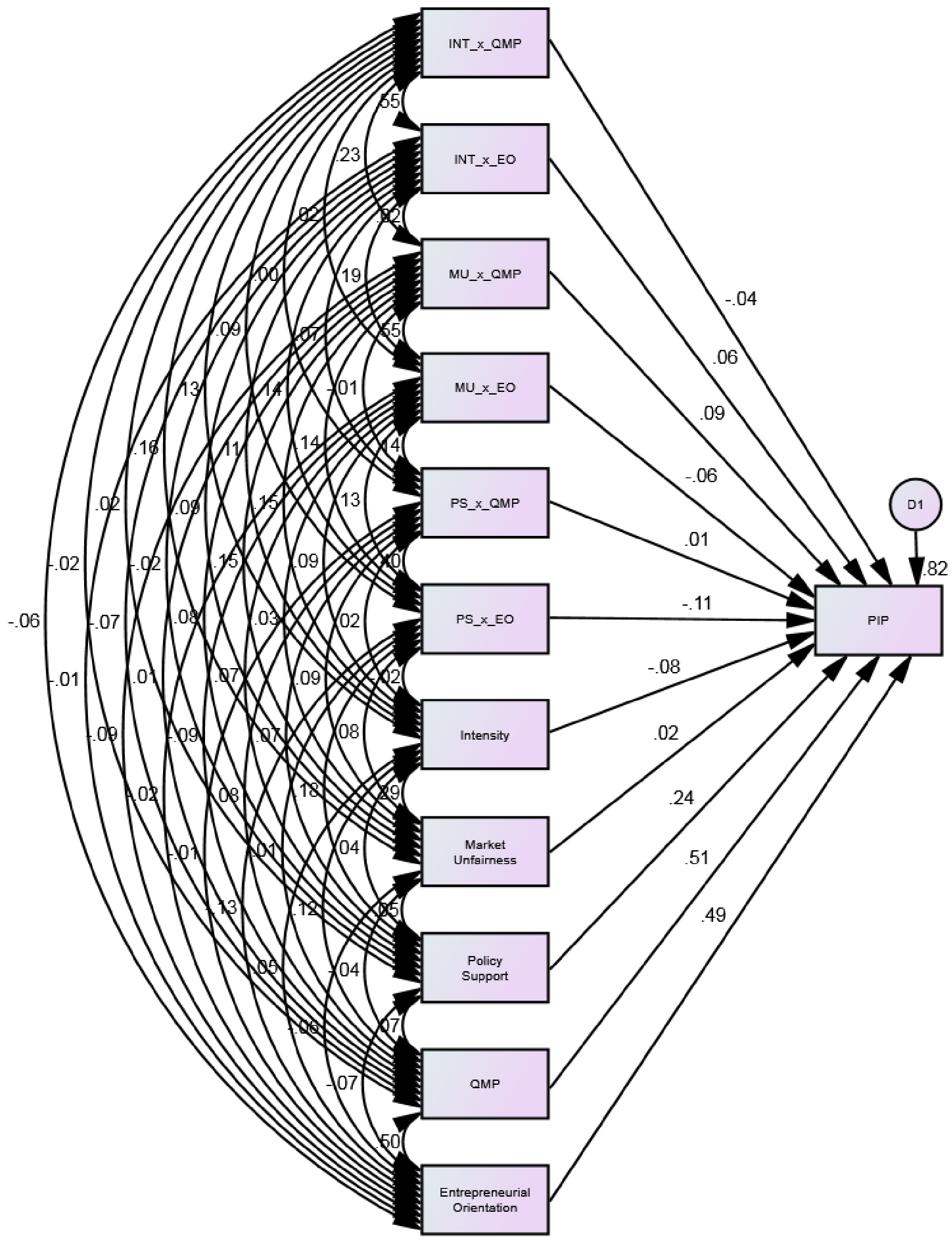

Figure 4.6 Standardized coefficients for the path moderator model.

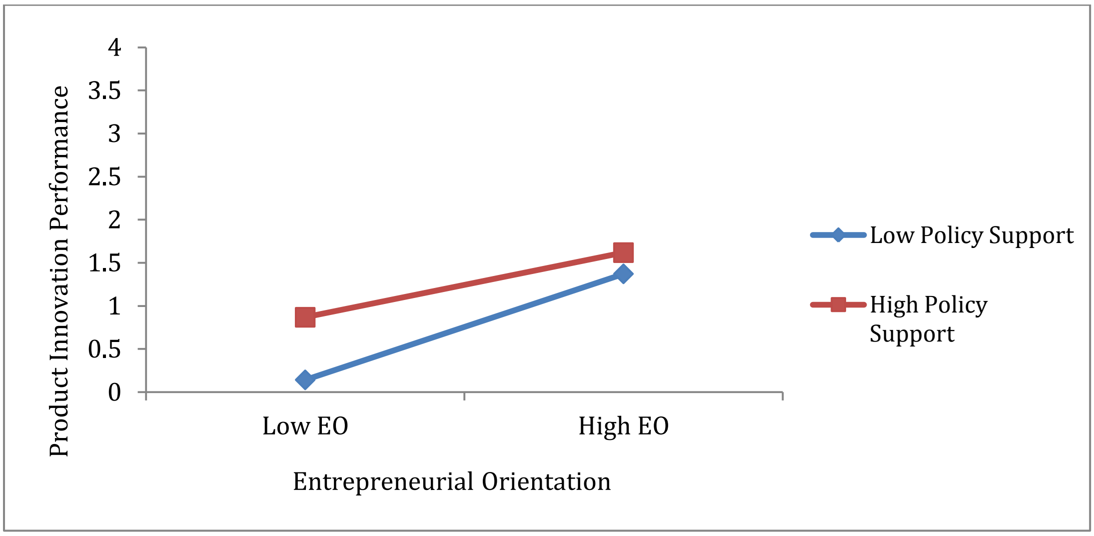

Figure 4.7 The moderating effect of policy support on entrepreneurial orientation and product innovation performance.

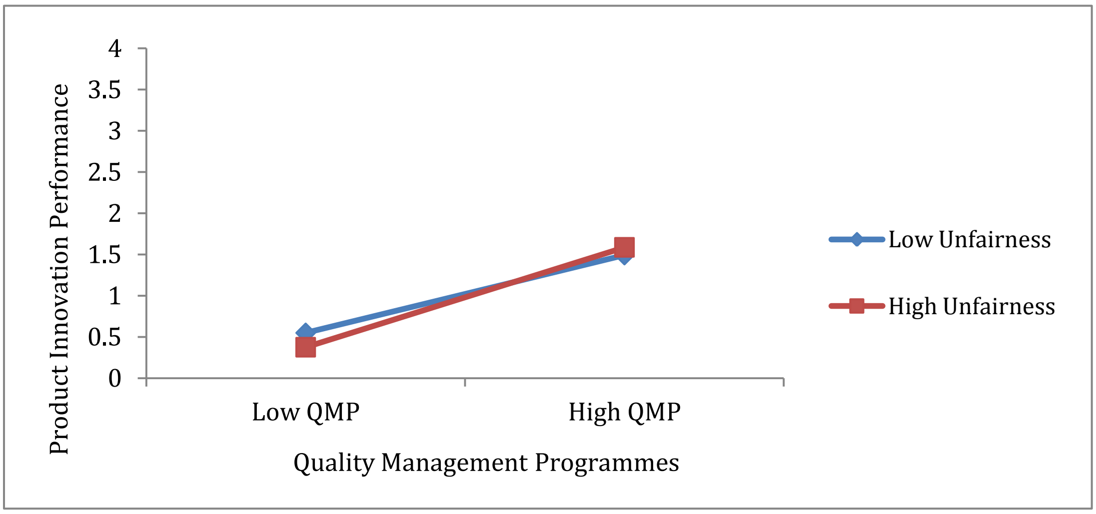

Figure 4.8 The moderating effect of market unfairness on quality management programmes and product innovation performance.

4.6 Summary of Results

4.6.1 Results for the main hypotheses

The results of the hypotheses tests are summarized in Table 4.22. As Table 4.22 shows, entrepreneurial orientation (EO) has a positive effect on product innovation performance (PIP) ($\beta = .49$, $p < .001$) and thus H1 is supported. Quality management practices (QMP) also exerted a positive influence on product innovation performance (β = .51, $p < .001$), thus in support of H2. As Figure 4.4 reveals, in the absence of moderating variables, the two variables of EO and QMP alone had a strong explanatory power on the dependent variable PIP ($R^2 = 0.67$).

Table 4.22 *Results for Hypotheses Tests*

Hypothesis	**Path**	**Standard-ized path coeff β**	**Result**
Direct Path			
H1:	EO → PIP (+)	.49***	supported
H2:	QMP → PIP (+)	.51***	supported
Moderated Paths			
H1a:	Market unfairness weakens EO—PIP (-)	-.06	rejected
H1b:	Policy support weakens EO—PIP (-)	-.11***	supported
H1c:	Competitive intensity increases EO—PIP (+)	.06	rejected
H2a:	Market unfairness weakens QMP—PIP (-)	.09*	supported
H2b:	Policy support increases QMP—PIP (+)	.01	rejected
H2c:	Competitive intensity weakens QMP—PIP (-)	-.04	rejected

* $p < .05$; ** $p < .01$; *** $p < .001$.

4.6.2 Results for the moderating effects

Table 4.22 also shows the results for the moderating effect hypotheses. H1a tests the negative moderating role of marketing unfairness on EO and PIP, and since it was not significant ($p > .05$), the dampening effect of market unfairness on EO-PIP was not established. However, the weakening effect of policy support on EO and PIP reported a significant result (β = -.11, p < .001), indicating that strong policy support was indeed a hindrance rather than a catalyst for product innovation performance of an entrepreneurially oriented firm, and thus H1b receives support. However, results did not support the proposed positive moderating effect of competitive intensity on EO-PIP ($p > .05$), which means that external competitive intensity did not exert any strengthening effect on the product innovation performance of EO firms. H2c was therefore not supported.

H2a, H2b and H2c are the hypothesized moderating effects on the direct relationship between quality management practices (QMP) and PIP. As Table 4.22 shows, the hypothesized negative effect of market unfairness on QMP and PIP was significant (β =. 09, $p < .05$), though at the significance level of H1, H2 and H1b. Thus H2a was supported, suggesting that under unfair market conditions, the effect of QMP on product innovation outcomes tended to be weakened. For the other two moderating effects, they did not receive any significant support ($p > .05$). In other words, the proposed strengthening effect of policy support on QMP and PIP did not exist, neither was the diminishing effect of competitive intensity on QMP and PIP. In sum, the positive effect of EO and QMP on PIP played a dominant role ($R^2 = .67$), with only two moderating effects contributed significantly to the proposed moderated model as revealed by figure 4.6 ($R^2 = .82$). Discussion of the results and their implications are given in Chapter 5.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

This chapter begins with a brief recapitulation of the key findings reported in Chapter 4, with discussion of the implications of those findings for theory and practice. Limitations of this research are indicated and directions of future research are highlighted.

5.1 Overview of key findings

5.1.1 Direct relationships

This thesis confirms two causal relationships among the sampled Hong Kong owned electronics manufacturing firms in the Pearl River Delta region: EO and QMP both have positive and significant relationships with PIP, with the QMP's predictive strength slightly stronger than EO's.

The reported positive effect of EO on innovation performance is consistent with prior findings (Avlonitis and Salavou, 2007; Berends et al., 2013; Hong et al, 2013; Patel et al., 2014; Perez-Luno et al., 2011; Wong, 2014; Zhou, et al., 2007; Zortea-Johnston et al., 2012). This finding is explained by the intrinsic nature of EO--a proactive tendency (Lumpkin and Dess, 1996; Wong, 2014) to experiment with novel solutions for emerging market and technological opportunities; thus leading to increased product innovation outcomes (Boso et al., 2012; Patel et al., 2014; Perez-Luno et al., 2011; Liu et al., 2014). As product innovation is inherently risky and requires upfront resource commitment (Llopis et al., 2014), a firm with strong entrepreneurial orientation has higher readiness to explore innovation activities and its associated risks (Kreiser et al., 2010; Llopis et al., 2014). Given that Hong Kong electronics manufacturing firms, in general, lack political prowess to gain favourable support for R&D (Sharif and Huang, 2012), the entrepreneurial drive for innovation plays a more important role in the pursuit of PIP (Wong, 2014).

The positive causal relationship between QMP and PIP reported here adds to the growing body of literature supporting the view of QMP leading to innovation outcomes (e.g. Abrunhosa and Sa, 2008; Cruz et al., 2014; Long, Aziz and Hamizan, 2013; Hung et al., 2011; Kim, et al., 2012; Lee et al., 2013; Moreno-Luzon et al., 2013 a & b; Ooi et al., 2012; Prajogo and Sohal, 2003 & 2004). As suggested by Zhang et al. (2012 & 2014), QMP has dual properties, deployable in either exploitative or explorative mode (Moreno-Luzon et al., 2013b). When QMP implementing firms see feedback from QMP as a source of new knowledge (Asif et al., 2013; Hung et al., 2010; Jones and Linderman, 2014; Zhang et al., 2012), the organizational learning improves (Hung et al., 2011) and facilitates outcomes such as PIP (Kim et al., 2012; Moreno-Luzon et al., 2013b). Findings in this study suggest that this mechanism offers a feasible explanation for Hong Kong electronics firms' PIP.

An important contribution of these findings is the investigation of complementary effects from EO and QMP on PIP, which has not been addressed in published literature. As observed by Patel et al. (2014), while EO promotes forward-thinking and experimentation leading to increased innovation outcomes, it does not prevent failure. Despite the likelihood of innovation failures, it is suggested that firms engaging in experimentation outperform those who do not (Wilkund and Shepherd, 2011). When an EO firm also implements an integrated QMP system, its employees are able to learn from failures and exploratively seek for refinement and improvement (Hung et al., 2011; Sitkin et al., 1994; Zhang et al., 2012). This further increases product innovation success and outcomes (Cruz et al., 2014). Although there is no prior research on the joint effects of EO and QMP on PIP, there are suggestions that QMP has an absorptive capacity (Cruz et al., 2014; Perez-Arostegui et al., 2013), an innovative capability (Lopez-Mielgo et al, 2009: Prajogo and Ahmed, 2006), as well as an adaptive capability (Anand et al., 2009; Wang and Ahmed, 2007). There is evidence from literature that these three capabilities, particularly absorptive capacity, have a positive role in promoting innovation performance (Biedenbach and Muller, 2012; Gebauer, Worch and Truffer, 2012; Kostopoulos et al., 2011; Zahra and George, 2002). So, though there is no prior research on the joint effect of EO and QMP on PIP for examination, the underlying logic of the proposed model aligns with the mainstream literature, and thus lends support to the posited conceptualization.

5.1.2 Moderating effects

Earlier in this thesis six hypotheses were developed, based on the moderating effects of market unfairness, policy support and competitive intensity on the two main effects. The inclusion of external moderating factors is relevant in the context of this thesis' model and serves several purposes. First, the proposed model attempts to capture the complexities pertinent to the transitional state of the electronics industry in the PRD region. No realistic conclusion can be drawn from a model without accessing external influences on the direct relationship. Second, as both predictors are related to the abilities of a firm to respond to external demands, studying how EO and QMP stimulate PIP under multiple external variables extends understanding of their little known joint effects. Moreover, while there are a few studies of EO→PIP and QMP→PIP under moderation of one external variable (e.g. Sander-Jones and Linderman, 2014; Wong, 2014), the majority of studies in the two fields still lack testing of external contexts (Bon et al., 2012; Rauch et al., 2009); hence the inclusion of moderators in this model also contributes knowledge in these two areas. Further discussion of findings on individual moderators continues below.

5.1.2.1 The role of market unfairness

Market unfairness on EO—PIP

Results in this research indicate that the weakening role of market unfairness on theEO—PIP relationship (H1a) is not supported, though a dampening effect on the QMP—PIP link (H2a) is supported. For the former hypothesis, the earlier reasoning posited that, under an unfair competition environment where the innovating firms' intellectual properties are infringed by commonplace free-riding (Li and Atuahene-Gima, 2001; Gao, 2011; Hunter and Puliti, 2012), the rational entrepreneurial firm is discouraged to put in extra input for product innovation. Under its rational risk-calculation, investment for innovation does not pay off any more (Miller, 2007). The unsupported result of this hypothesis suggests that the EO—PIP relationship is robust to this external threat. This is not to suggest that Hong Kong firms, at least from the respondents' point of view, do not consider intellectual property theft is not serious. As shown in Table 4.6, 55.1% of respondents worry about intellectual property protection in China, suggesting that the problem is not a light matter. Though there is no known prior research studying how market unfairness affects EO—PIP relationship, there are at least two explanations for the lack of moderating effect on the relationship.

First, many electronics firms in the PRD region are competing for and selling to industrial customers rather than selling to consumers (Lau et al., 2010), where the counterfeit problem is most rampant (Pecht and Tiku, 2006; Pecht, 2013). The highly integrated electronics supply chain requires their members to adhere to stringent performances, and the partnership is protected by legal agreements on intellectual protection (Humphreys et al., 2011; Wu et al., 2013) as well as by supply chain information technology (Yin, Yu and Zhou, 2012). The consequences for intellectual theft are devastating for any culprit firm, since a bad reputation will keep it out of business, unless it is selling to consumers/end users (Krueger, 2008).

Additionally, while the risk of intellectual robbery is real, the entrepreneurial firm may have factored such threats into their longer-term decisions in innovation. Since many HKEI firms are predominantly exporting to developed countries (Chu, 2013a), protection through patenting, trademark or design registrations offer sufficient measure against potential threats (Cheung et al., 2014). So the firm with high EO will still pursue business and technological opportunities when they offer attractive economic returns, and the EO—PIP effect is not seriously compromised by market unfairness in China.

Market unfairness on QMP--PIP

The hypothesis of market unfairness having a weakening effect on the QMP—PIP relationship was found to be significant and supported. The hypothesis was developed from reasoning that when there is widespread violation of the firm's intellectual property, innovation efforts become unrewarding and firms are tempted to compete exploitatively (e.g. cost, quality and speed) instead (Zhang et al. 2012). As in the case of EO—PIP linkage, there is no known prior study on QMP—PIP for comparison. Limited prior evidence suggests that under high environmental hostility, the impact of ambidextrous capabilities on performance is amplified (De Clercq, Thongpapanl and Dimov, 2014). A similar strengthening effect is reported for process improvement on innovation performance (Sander-Jones and Linderman, 2014). However, caution must be applied to these comparisons, as although QMP is assumed to be ambidextrous (Asif and de Vries, 2014), prior findings share a close but not identical operationalization to QMP (De Clercq al., 2014; Sander-Jones and Linderman, 2014); some results are ambiguous (Sander-Jones and Linderman, 2014), and none use market unfairness or dysfunctional competition (Atuahene-Gima and Ko, 2001) as the moderating variable. Hence, further evidence is required to clarify how perceived unfairness in competition affects QMP—PIP.

5.1.2.2 The role of government policy support

Policy support on EO—PIP

The weakening effect of policy support on the direct EO-PIP relationship is supported in this research. This is contrary to the conventional wisdom, that political/policy support is instrumental in emerging economies for conducting business (Sheng, Zhou and Li, 2011), and even to product innovation (Wu, 2011). The explanation for this discrepancy is attributed to the double-edged nature of discretionary policy favour: it helps the benefited firm to face less competition for information and resources in the short run, it also undermines the firm's alertness to opportunities, appetite to take risks and the drive to overcome difficulties by innovative solution in the longer run (Boso et al., 2012; Covin and Slevin, 1989; Huang and Wang, 2011; Wu, 2011). Since product innovation projects take time to develop and complete, a reliance on policy favours not only dissipates entrepreneurial propensity of a firm, but the costs of gaining such policy favours (e.g. time, effort and money) outweigh the short-term benefits received as suggested by Wu's study in China (2011).

Mixed results are also reported by Naqshbandi and Kaur (2014), who suggest that ties with government officials facilitate in-bound open innovation but not out-bound open innovation in Malaysia, and differs across industries. Xie, Liu and Gao (2014) report that political ties benefit PIP through acquisition of resources at the innovation generation stage, as well as promoting adoption of the final products. However, policy support or favours are usually enjoyed by large and influential domestic firms or state-owned enterprises in China, and in the PRD region Hong Kong electronics manufacturers are usually politically marginalized so it is doubtful that many Hong Kong firms are recipients of supportive policy (Peighambari et al., 2014; Sharif and Huang, 2012). HKEI firms rely mainly on endogenous innovation resources (Peighambari et al., 2014).

In summary, the findings find support in the literature though there are few studies covering Hong Kong firms in the PRD context. Since the effect of policy support on the EO—PIP relationship is highly contextual to the population of receiving firms, more research is needed on different populations and in different geographical regions for a better understanding of the underlying mechanism.

Policy support on QMP—PIP

Findings reported in this study indicate that the amplifying role of policy support on QMP and PIP is not significant, suggesting that the direct relationship is an endogenous process. This hypothesis argues from the point that policy support facilitates acquisition of critical strategic resources, such as licenses or approvals, which are otherwise difficult to obtain under a semi-market condition (He, Mai and Stam, 2013; Yu et al. 2014; Zhou and Li, 2007). The accumulation of resources, according to this assumption, leads to a build up of slacks and hence promotes product innovation outcomes (Liu et al, 2014).

The rejection of this hypothesis in analysis suggests that external policy support plays little role in the stimulation of PIP through QMP. Here, the unsupported hypothesis is explained by HKEI firms' own efforts to acquire and accumulate resources as suggested by some researchers (Peighambari et al., 2014). This assertion is also reported by other research on Hong Kong manufacturers in thePRD region, which claims that these firms rely mainly on their own resources for innovation and upgrading (Lau et al., 2013; Sharif and Huang, 2012). Moreover, most of the critical resources for innovation are knowledge-based, and their diffusion is suggested to be intra-organizational and hence within the firm's control (Fu et al., 2013). Electronics firms in the PRD region learn from interactions with other firms and members along the supply chain as well asfrom research institutes (Prodi, 2012). Government plays little role in this knowledge transfer (Fu et al., 2013; Yam et al., 2011).

In summary, the role of government in facilitating innovation, at least from the Hong Kong firms' perspective, is limited as knowledge-based resources are obtainable either from internal (QMP's exploration), or from learning from informal networks.

5.1.2.3 The role of competitive intensity

Competitive intensity on EO—PIP

The hypothesized amplifying effect of competitive intensity on the EO—PIP link was found insignificant upon testing. This external effect on EO and firm performance is well documented, and in studies employing this variable alone as moderator, some results indicate a significant strengthening effect (Covin and Slevin, 1989; Ensley, Pearce and Hmieleski, 2006; Kraus et al., 2012; Wilkund and Shepherd, 2005; Zahra and Garvis, 2000). Another study by Boso et al. (2012) reports that when the joint effects of EO market orientation on exports, new product success improves under higher levels of competition intensity. Generally speaking, the findings in this stream remain inconclusive (Engelen et al., 2014; Su et al., 2011; Lumpkin and Dess, 2001; Moreno and Casillas, 2008). Furthermore, to date very few studies specifically test the relationship of EO—PIP. One rare example is a study by Dess and Lumpkin (2001), in which the relationship is subjected to multiple moderators, and the results become mixed and complex.

The lack of support of this hypothesis, together with equivocal findings from the literature, suggest that the interaction between competitive intensity, EO and PIP is more complex than previously suggested (Kraus et al., 2012). One explanation for this complexity is attributable to EO's inherent conceptual composition (Anderson et al., 2014; Covin and Wales, 2012), in which each dimension of EO—proactiveness, innovativeness and risk-taking, has different roles in influencing PIP, and differing interactions with competitive intensity (Wong, 2014). Hence to build a better picture for resolving this ambiguity, future researchers are advised to investigate the issue with a decompositional approach (Spanjol et al., 2012).

Competitive intensity on QMP→PIP

The proposed weakening effect of competitive intensity on QMP and PIP was also unsupported and insignificant. In other words, the refocusing of QMP from exploration to exploitation, as a response to cope with increased competitive pressure, is unsound (Auh and Menguc, 2005). Explanation for this discrepancy can be developed from insights of prior studies.

While research on this particular hypothesis is scant in literature, extant evidence indicates only certain practices of the QM system, such as process control and process improvement, have their impact on innovation performance magnified under higher competitive intensity (Sander-Jones and Linderman, 2014), though the overall results are inconclusive. On the other hand, there are more prior studies on the effect of competitive intensity on the QMP—firm performance linkage. For example, high competitive intensity interacts positively on the QMP—firm performance relationship in two hotel studies (Patiar, Davidson and Wang, 2012; Wang, Chen and Chen, 2012). Chong and Rundus (2004) also indicate that the QM practices of "product design" and "customer focus" contribute positively to firm performance, and these direct effects are increased under higher competitive intensity. This finding is particularly interesting as it reveals the complex relationships between individual dimensions and firm performance, a point that resonates with Prajogo and Sohal's assertion (2001) that QMP (TQM in their term) is a multidimensional construct, and thus individual practices may have different effects on PIP. Additionally, Kim et al. (2012) demonstrate that complex relationships exist between dimensions of QMP and PIP. So with the addition of competitive intensity, the overall mechanism becomes more complex than previously assumed, and that is why researchers and practitioners warn against arbitrary reliance on specific practices (Juran and DeFoe, 2010; Kim et al. 2012).

In conclusion, the lack of support for this hypothesis can be explained by the argument that complex interactions exist between separate QMP dimensions, as well as with PIP (Fasil and Osada, 2014; Kim et al., 2012), and the complexity increases with the insertion of the competitive intensity moderator. Hence, further research is needed to explore how these interactions affect PIP for improved conceptual clarity.

5.2 Recommendations to managers

Based on the findings of this research, several recommendations can beoffered to managers of the HKEI and other interested parties, for the purpose of improving their PIP.

Firstly, since QMP has been proved to be supportive to higher levels of PIP, it is suggested that managers should consider upgrading their level of sophistication in quality management. Table 4.7 shows that among HKEI firms sampledjust over half of the respondents reported that they had implemented higher levels of QM such as six sigma and TQM. Hence, it is imperative for firms to upgrade their existing QM implementation. Also, as suggested by scholars (Zhang et al., 2012; Zhang et al., 2014), QMP should be implemented in an explorative orientation and with innovativeness (Wiengarten et al., 2013) to facilitate knowledge creation (Choo et al., 2007) becoming an internal source of innovation. Besides, an explorative implementation of QMP also allows the organization to be inquisitive for new ideas for innovation from all sources (Hung et al., 2011), such as with supply chain partners and business associates (Fu et al., 2013). Thus, firms are in a better position to experiment with adopting higher level QM implementation with a learning attitude.

Moreover, this study also confirms the role of EO on PIP, suggesting that a firm enjoys better PIP when adopting a proactive, risk-taking and innovative attitude in behaviours and decision styles (Covin and Dess, 1989; Liu et al., 2014). This finding resonates with the assertion that QMP leads to better PIP especially under an explorative climate. To facilitate EO of HKEI firms, it is necessary for them to embrace the three components of EO in product innovation decisions. For example, as shown by Table 4.4, most Hong Kong firms report “adapting customers’ changing requirements” ,”engaging ODM businesses” and “developing new markets” as the top three reasons for product innovation. Though market-driven product innovation is desirable for survival, HKEI firms should experiment with new technologies and rebalance their product portfolio with market-driven and technology-driven mandates (Brem and Voigt, 2009). To switch away from market-driven product innovation, management has to adhere to the EO tenets that truly empower responsible risk-taking, proactive responses to emerging opportunities and experimentation with novel technologies or solutions among the rank and file. Moreover top managers should be ready to become advocates for these new ideas and allocate resources for their development.

Lastly, since the EO—PIP and QMP—PIP linkages are robust to external influences, except for H1b and H2a, managers should pay attention to their implications. Policy support is found to be unhelpful to the EO—PIP relationship, suggesting that firms should not rely too much on the mythical guanxi (Peng and Luo, 2000). Instead firms benefit more from developing endogenous capabilities and resources for innovation (Peighambari et al., 2014), a point which has been repeated in this thesis. Market unfairness is also found to have an adverse effect on the QMP—PIP linkage, hence managers should not let these malpractices divert their attention to short-term competition. Stronger determination of resolving intellectual infringement through legal means (Orr and Roth, 2012) is one way to combat this threat to product innovation propensity. In fact, as shown by this study’s findinghs, an EO firm is not perturbed by these dysfunctional competitive practices, which again highlight the confidence and resourcefulness of the EO firm to overcome novel problems.

As a conluding remarks, this research highlighted the importance of managerial attitude and firm-level mindset in influencing product innovation, especially with a quality management system in place. While the earlier findings differs in their opinions on specific practices or infrastructural elements of QM lead to improved PIP, this study argues from the view that collective mentality plays a more important role leading to explorative QM implementation, and hence brings product innovation. Attempts to identify specific QM practices, whether 'hard' or 'soft' ones, and match them to innovation performance is unlikely to be conclusive (Cruz et al., 2014; Silva et al., 2014) as many such studies do not consider firm-level attitude and multiple idiosyncratic contextual factors. As Sitkin et al, (1994) point out, quality management as a theory is also subjected to contingent influences, and a generic implementation approach of QMP as advocated by earlier 'gurus' (e.g. Deming, 1986) is unlikely to be as effective as they claimed, especially when outcomes such as higher-order learning and innovation are desired. Rather this study points out a more succinct way out--that an entreprenrueial climate is a context that is highly conducive to QM-driven innovation, and more importantly, this EO and QMP combined effects on PIP are highly robust to multiple external challenges. Thus as an advice for managers pursuiting improved PIP in China or similar complex transitional context, fostering an entrepreneurial orientated QM system should be top on their strategic agenda.

5.3 Limitations and future research directions

This research has several limitations which should provide opportunities for future work. The following are the theoretical limitations identified in the proposed model.

First, this study's model does not study the individual dimensions of QMP and EO and their respective impacts on PIP. It has been suggested that the QMP construct is multidimensional (Prajogo and Sohal, 2001) and the same has been suggested for the construct of EO (Covin and Lumpkin, 2011; Covin and Wales, 2012). Future research could further explore the relationship between dimensions of EO and QMP on PIP, as the relationships may be complicated (Kim et al., 2012; Singh, 2004).

Second, the impacts of other strategic orientations should also be considered in future as this study only investigates the impact of EO on innovation. Prior studies suggest that market orientation (MO) has also two approaches, responsive and proactive (Atuahene-Gima, Slater and Olson, 2005; Narver et al., 2004; Tsai, Chou and Kuo, 2008), and learning orientation, together with EO are also suggested to be antecedents of organizational innovativeness (Hult, Hurley and Knight, 2004). Hence, further investigations on the combined effects of different strategic orientations and EO on PIP would be valuable as current evidence is scant (e.g. Zhou, Yim and Tse, 2005, Zhang and Duan, 2010).

Moreover, the number and choice of moderating variables are limited in scope and the model does not test other pertinent contextual factors, such as environmental turbulence, dynamism, managerial ties or ownership background of firms (Jansen, Van den Bosch and Volberda, 2006; Wang, Chen and Chen, 2012; Zhang, Linderman and Schroeder, 2012). Future researchers may consider including a wider variety of contextual moderators in their models.

There are also some methodological problems in the sampling approach. This study employed single sourcing of a cross-sectional sample highly concentrated in one region (PRD), thus restricting the generalizability of findings to Hong Kong firms in other regions of China (Zikmund et al., 2012). Further research efforts could focus on

Hong Kong electronics manufacturers in other regions in China, and adopt a longitudinal design for expanded generalizability. Future studies may also consider this issue and include these considerations in their refined designs.

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APPENDIX A

Assessment of Normality Results from AMOS 21

APPENDIX A

Assessment of Normality Results from AMOS 21

Variable	min	max	skew	c.r.	kurtosis	c.r.
PIP_01	2.000	7.000	-.287	-1.743	-.379	-1.152
PIP_02	2.000	7.000	-.264	-1.608	-.502	-1.526
PIP_03	2.000	7.000	-.106	-.642	-.500	-1.522
PIP_04	2.000	7.000	-.318	-1.932	-.367	-1.116
PIP_05	2.000	7.000	-.060	-.368	-.696	-2.116
Ent_01	3.000	7.000	.085	.518	-.700	-2.129
Ent_02	3.000	7.000	-.130	-.790	-.814	-2.477
Ent_03	3.000	7.000	-.031	-.191	-.450	-1.367
Ent_04	2.000	7.000	-.416	-2.530	-.270	-.821
Ent_05	2.000	7.000	-.472	-2.872	-.413	-1.257
Prs_01	1.000	7.000	-.358	-2.178	-.261	-.793
Prs_02	1.000	7.000	-.241	-1.463	-.374	-1.139
Prs_03	1.000	7.000	-.365	-2.222	-.281	-.856
Prs_04	1.000	7.000	-.444	-2.699	.065	.197
Prs_05	2.000	7.000	-.531	-3.231	.130	.395
Prs_06	1.000	7.000	-.781	-4.753	.859	2.612
Ppl_01	1.000	7.000	-.158	-.964	-.215	-.653
Ppl_02	2.000	7.000	-.368	-2.239	-.302	-.917
Ppl_03	1.000	7.000	-.275	-1.673	-.257	-.780
Ppl_04	1.000	7.000	-.392	-2.382	-.315	-.958
Ppl_05	2.000	7.000	-.431	-2.620	-.199	-.606
Info_01	1.000	7.000	-.417	-2.537	-.060	-.183
Info_02	1.000	7.000	-.586	-3.563	.163	.496
Info_03	1.000	7.000	-.702	-4.272	.431	1.311
Info_04	1.000	7.000	-.360	-2.192	-.557	-1.695
Cust_01	2.000	7.000	-.861	-5.240	.535	1.628
Cust_02	2.000	7.000	-.372	-2.261	-.262	-.796
Cust_03	1.000	7.000	-.741	-4.505	.358	1.088
Cust_04	2.000	7.000	-.779	-4.741	.547	1.665
Cust_05	1.000	7.000	-.763	-4.642	.486	1.477
Cust_06	1.000	7.000	-.544	-3.306	-.461	-1.403
Str_01	1.000	7.000	-.548	-3.331	-.271	-.824
Str_02	1.000	7.000	-.851	-5.179	1.101	3.349
Str_03	2.000	7.000	-.204	-1.241	-.373	-1.134
Str_04	1.000	7.000	-.525	-3.194	-.471	-1.432
Lead_01	1.000	7.000	-.673	-4.092	.025	.076
Lead_02	1.000	7.000	-.651	-3.958	.022	.066
Lead_03	1.000	7.000	-.599	-3.641	-.019	-.059
Lead_04	1.000	7.000	-.455	-2.770	-.193	-.588
Multivariate					199.560	26.289

APPENDIX B

Bollen-Stine Bootstrap Results

APPENDIX B

Bollen-Stine Bootstrap Results

Iterations	Method 0	Method 1	Method 2
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	2	0
8	0	43	0
9	0	153	0
10	0	217	0
11	0	261	0
12	0	157	0
13	0	92	0
14	0	35	0
15	0	22	0
16	0	11	0
17	0	3	0
18	0	1	0
19	0	3	0
Total	0	1000	0

0 bootstrap samples were unused because of a singular covariance matrix.
0 bootstrap samples were unused because a solution was not found.
1000 usable bootstrap samples were obtained.

Bollen-Stine Bootstrap (Default model)

The model fits better in 1000 bootstrap samples.
It fits about equally well in 0 bootstrap samples.
Fit is worse or failed in 0 bootstrap samples.
Testing the null hypothesis that the model is correct, Bollen-Stine bootstrap p = .001

Bootstrap Distributions (Default model)

```
                              |--------------------
                   566.481    |*
                   610.309    |**
                   654.136    |****
                   697.963    |*******
                   741.790    |***************
                   785.617    |*******************
                   829.444    |*******************
N = 1000           873.271    |*******************
Mean = 835.387     917.098    |************
S. e. = 3.180      960.925    |**********
                  1004.752    |****
                  1048.579    |***
                  1092.407    |**
                  1136.234    |*
                  1180.061    |*
                              |--------------------
```

APPENDIX C

Mahalanobis D^2 Values for the Top Twenty Cases

APPENDIX C

Mahalanobis D^2 Values for the Top Twenty Cases

Observation number	Mahalanobis d-squared	p1	p2
103	97.660	.000	.000
84	86.484	.000	.000
109	83.707	.000	.000
40	80.615	.000	.000
8	76.426	.000	.000
65	75.939	.000	.000
67	72.958	.001	.000
18	70.901	.001	.000
75	70.116	.002	.000
79	67.313	.003	.000
19	66.212	.004	.000
34	65.962	.004	.000
26	65.437	.005	.000
88	65.289	.005	.000
91	65.023	.006	.000
218	60.930	.014	.000
14	60.234	.016	.000
208	58.960	.021	.000
31	57.365	.029	.000
87	56.841	.032	.000

APPENDIX D

Results from the Final QMP Measurement Model

APPENDIX D

Results from the Final QMP Measurement Model

Unstandardized Regression Weights

			Estimate	S.E.	C.R.	P
Leadership	<---	Quality_Management_Practices	1.000			
Strategic_Planning	<---	Quality_Management_Practices	.977	.100	9.736	***
Customer_Focus	<---	Quality_Management_Practices	.438	.047	9.392	***
Information_and_Analysis	<---	Quality_Management_Practices	1.212	.122	9.949	***
People_Management	<---	Quality_Management_Practices	.935	.102	9.160	***
Process_Management	<---	Quality_Management_Practices	.912	.100	9.153	***
Lead_04	<---	Leadership	1.000			
TLEAD_02	<---	Leadership	.427	.035	12.152	***
TLEAD_01	<---	Leadership	.435	.037	11.789	***
Str_03	<---	Strategic_Planning	1.000			
TSTR_02	<---	Strategic_Planning	.435	.035	12.378	***
TSTR_01	<---	Strategic_Planning	.475	.040	11.961	***
TCUST_06	<---	Customer_Focus	1.000			
TCUST_04	<---	Customer_Focus	.772	.072	10.764	***
Cust_02	<---	Customer_Focus	1.914	.161	11.883	***
TCUST_01	<---	Customer_Focus	.928	.076	12.185	***
Info_04	<---	Information_and_Analysis	1.000			
TINFO_03	<---	Information_and_Analysis	.329	.025	13.056	***
TINFO_02	<---	Information_and_Analysis	.367	.025	14.426	***
Info_01	<---	Information_and_Analysis	.841	.062	13.651	***
Ppl_04	<---	People_Management	1.000			
Ppl_03	<---	People_Management	1.093	.086	12.663	***
Ppl_02	<---	People_Management	1.079	.087	12.341	***
Ppl_01	<---	People_Management	1.060	.091	11.609	***
Prs_03	<---	Process_Management	1.000			
Prs_02	<---	Process_Management	1.233	.100	12.385	***
Prs_01	<---	Process_Management	1.235	.100	12.290	***

Standardized Regression Weights

			Estimate
Leadership	<---	Quality_Management_Practices	.879
Strategic_Planning	<---	Quality_Management_Practices	.959
Customer_Focus	<---	Quality_Management_Practices	.872
Information_and_Analysis	<---	Quality_Management_Practices	.892
People_Management	<---	Quality_Management_Practices	.860
Process_Management	<---	Quality_Management_Practices	.856
Lead_04	<---	Leadership	.758
TLEAD_02	<---	Leadership	.824
TLEAD_01	<---	Leadership	.799
Str_03	<---	Strategic_Planning	.739
TSTR_02	<---	Strategic_Planning	.835

			Estimate
TSTR_01	<---	Strategic_Planning	.808
TCUST_06	<---	Customer_Focus	.764
TCUST_04	<---	Customer_Focus	.722
Cust_02	<---	Customer_Focus	.790
TCUST_01	<---	Customer_Focus	.808
Info_04	<---	Information_and_Analysis	.798
TINFO_03	<---	Information_and_Analysis	.796
TINFO_02	<---	Information_and_Analysis	.859
Info_01	<---	Information_and_Analysis	.824
Ppl_04	<---	People_Management	.743
Ppl_03	<---	People_Management	.853
Ppl_02	<---	People_Management	.832
Ppl_01	<---	People_Management	.785
Prs_03	<---	Process_Management	.753
Prs_02	<---	Process_Management	.841
Prs_01	<---	Process_Management	.834

Variances

	Estimate	S.E.	C.R.	P	Label
Quality_Management_Practices	.744	.133	5.598	***	
D1	.219	.052	4.214	***	
D2	.062	.029	2.124	.034	
D3	.045	.010	4.536	***	
D4	.279	.059	4.725	***	
D5	.230	.047	4.863	***	
D6	.226	.048	4.685	***	
l4	.714	.083	8.597	***	
l2	.083	.011	7.452	***	
l1	.103	.013	7.968	***	
s3	.641	.070	9.225	***	
s2	.064	.008	7.897	***	
s1	.093	.011	8.428	***	
c6	.134	.015	8.707	***	
c4	.102	.011	9.112	***	
c2	.413	.049	8.361	***	
c1	.085	.011	8.061	***	
i4	.779	.089	8.807	***	
i3	.086	.010	8.835	***	
i2	.066	.008	7.754	***	
i1	.459	.054	8.457	***	
p4	.716	.078	9.175	***	
p3	.394	.052	7.566	***	
p2	.457	.057	8.040	***	
p1	.617	.070	8.757	***	
r3	.644	.074	8.745	***	
r2	.533	.074	7.197	***	
r1	.565	.077	7.375	***	

Squared Multiple Correlations

	Estimate
Process_Management	.733
People_Management	.739
Information_and_Analysis	.796
Customer_Focus	.761
Strategic_Planning	.919
Leadership	.773
Prs_01	.695
Prs_02	.707
Prs_03	.567
Ppl_01	.616
Ppl_02	.692
Ppl_03	.727
Ppl_04	.552
Info_01	.679
TINFO_02	.738
TINFO_03	.634
Info_04	.638
TCUST_01	.653
Cust_02	.624
TCUST_04	.522
TCUST_06	.583
TSTR_01	.653
TSTR_02	.697
Str_03	.547
TLEAD_01	.639
TLEAD_02	.679
Lead_04	.574

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	48	330.346	183	.000	1.805
Saturated model	231	.000	0		
Independence model	21	3408.668	210	.000	16.232

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.048	.873	.840	.692
Saturated model	.000	1.000		
Independence model	.507	.154	.070	.140

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.903	.889	.954	.947	.954
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.871	.787	.831
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	147.346	100.382	202.150
Saturated model	.000	.000	.000
Independence model	3198.668	3013.175	3391.482

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.495	.667	.454	.915
Saturated model	.000	.000	.000	.000
Independence model	15.424	14.474	13.634	15.346

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.060	.050	.071	.053
Independence model	.263	.255	.270	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	426.346	436.959	589.674	637.674
Saturated model	462.000	513.075	1248.018	1479.018
Independence model	3450.668	3455.312	3522.125	3543.125

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	1.929	1.717	2.177	1.977
Saturated model	2.090	2.090	2.090	2.322
Independence model	15.614	14.775	16.486	15.635

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	145	155
Independence model	16	17

APPENDIX E

Results from the Full Measurement Model

APPENDIX E

Results from the Full Measurement Model

Unstandardized Regression Weights

			Estimate	S.E.	C.R.	P
Leadership	<---	Quality_Mgmt_Practices	1.000			
Strategic_Planning	<---	Quality_Mgmt_Practices	.954	.098	9.702	***
Customer_Focus	<---	Quality_Mgmt_Practices	.434	.046	9.475	***
Information_and_Analysis	<---	Quality_Mgmt_Practices	1.206	.120	10.068	***
People_Management	<---	Quality_Mgmt_Practices	.933	.101	9.270	***
Process_Management	<---	Quality_Mgmt_Practices	.902	.098	9.205	***
Lead_04	<---	Leadership	1.000			
TLEAD_02	<---	Leadership	.425	.035	12.184	***
TLEAD_01	<---	Leadership	.435	.037	11.858	***
Str_03	<---	Strategic_Planning	1.000			
TSTR_02	<---	Strategic_Planning	.438	.036	12.213	***
TSTR_01	<---	Strategic_Planning	.482	.041	11.889	***
TCUST_06	<---	Customer_Focus	1.000			
TCUST_04	<---	Customer_Focus	.772	.072	10.758	***
Cust_02	<---	Customer_Focus	1.922	.161	11.945	***
TCUST_01	<---	Customer_Focus	.925	.076	12.158	***
Info_04	<---	Information_and_Analysis	1.000			
TINFO_03	<---	Information_and_Analysis	.328	.025	13.029	***
TINFO_02	<---	Information_and_Analysis	.368	.025	14.485	***
Info_01	<---	Information_and_Analysis	.841	.061	13.681	***
Ppl_04	<---	People_Management	1.000			
Ppl_03	<---	People_Management	1.091	.086	12.701	***
Ppl_02	<---	People_Management	1.076	.087	12.361	***
Ppl_01	<---	People_Management	1.059	.091	11.639	***
Prs_03	<---	Process_Management	1.000			
Prs_02	<---	Process_Management	1.231	.100	12.362	***
Prs_01	<---	Process_Management	1.237	.101	12.305	***
Ent_05	<---	Entrepreneurial_Orientation	1.000			
Ent_04	<---	Entrepreneurial_Orientation	.992	.066	15.040	***
Ent_03	<---	Entrepreneurial_Orientation	.755	.062	12.114	***
Ent_02	<---	Entrepreneurial_Orientation	.899	.068	13.269	***
PIP_05	<---	Product_Innovation_Perf	1.000			
PIP_03	<---	Product_Innovation_Perf	.856	.068	12.666	***
PIP_02	<---	Product_Innovation_Perf	.985	.067	14.766	***
PIP_01	<---	Product_Innovation_Perf	.918	.065	14.129	***

Standardized Regression Weights

			Estimate
Leadership	<---	Quality_Mgmt_Practices	.885
Strategic_Planning	<---	Quality_Mgmt_Practices	.950
Customer_Focus	<---	Quality_Mgmt_Practices	.873
Information_and_Analysis	<---	Quality_Mgmt_Practices	.895
People_Management	<---	Quality_Mgmt_Practices	.864
Process_Management	<---	Quality_Mgmt_Practices	.853
Lead_04	<---	Leadership	.759
TLEAD_02	<---	Leadership	.822
TLEAD_01	<---	Leadership	.800
Str_03	<---	Strategic_Planning	.734
TSTR_02	<---	Strategic_Planning	.834
TSTR_01	<---	Strategic_Planning	.812
TCUST_06	<---	Customer_Focus	.764
TCUST_04	<---	Customer_Focus	.722
Cust_02	<---	Customer_Focus	.793
TCUST_01	<---	Customer_Focus	.806
Info_04	<---	Information_and_Analysis	.799
TINFO_03	<---	Information_and_Analysis	.794
TINFO_02	<---	Information_and_Analysis	.861
Info_01	<---	Information_and_Analysis	.824
Ppl_04	<---	People_Management	.744
Ppl_03	<---	People_Management	.853
Ppl_02	<---	People_Management	.831
Ppl_01	<---	People_Management	.785
Prs_03	<---	Process_Management	.753
Prs_02	<---	Process_Management	.839
Prs_01	<---	Process_Management	.835
Ent_05	<---	Entrepreneurial_Orientation	.840
Ent_04	<---	Entrepreneurial_Orientation	.862
Ent_03	<---	Entrepreneurial_Orientation	.734
Ent_02	<---	Entrepreneurial_Orientation	.784
PIP_05	<---	Product_Innovation_Perf	.780
PIP_03	<---	Product_Innovation_Perf	.792
PIP_02	<---	Product_Innovation_Perf	.898
PIP_01	<---	Product_Innovation_Perf	.865

Covariances

			Estimate	S.E.	C.R.	P
Entrepreneurial_Orientation	<-->	Product_Innovation_Perf	.682	.099	6.911	***
Entrepreneurial_Orientation	<-->	Quality_Mgmt_Practices	.385	.075	5.132	***
Product_Innovation_Perf	<-->	Quality_Mgmt_Practices	.635	.096	6.593	***

Correlations

			Estimate
Entrepreneurial_Orientation	<-->	Product_Innovation_Perf	.682
Entrepreneurial_Orientation	<-->	Quality_Mgmt_Practices	.454
Product_Innovation_Perf	<-->	Quality_Mgmt_Practices	.713

Variances

	Estimate	S.E.	C.R.	P
Entrepreneurial_Orientation	.951	.128	7.432	***
Product_Innovation_Perf	1.050	.156	6.748	***
Quality_Mgmt_Practices	.756	.134	5.655	***
D1	.209	.050	4.148	***
D2	.074	.030	2.485	.013
D3	.044	.010	4.558	***
D4	.273	.058	4.726	***
D5	.225	.046	4.856	***
D6	.230	.048	4.745	***
l4	.711	.082	8.621	***
l2	.084	.011	7.552	***
l1	.102	.013	7.998	***
s3	.653	.071	9.244	***
s2	.064	.008	7.873	***
s1	.091	.011	8.317	***
c6	.134	.015	8.719	***
c4	.103	.011	9.127	***
c2	.407	.049	8.327	***
c1	.086	.011	8.116	***
i4	.778	.088	8.823	***
i3	.087	.010	8.881	***
i2	.065	.008	7.752	***
i1	.459	.054	8.478	***
p4	.714	.078	9.179	***
p3	.394	.052	7.593	***
p2	.459	.057	8.080	***
p1	.616	.070	8.772	***
r3	.644	.074	8.740	***
r2	.538	.074	7.232	***
r1	.561	.076	7.339	***
e5	.396	.053	7.491	***
e4	.322	.047	6.877	***
e3	.464	.051	9.082	***
e2	.481	.056	8.532	***
n5	.677	.074	9.127	***
n3	.456	.051	9.000	***
n2	.245	.036	6.727	***
n1	.297	.038	7.785	***

Squared Multiple Correlations

	Estimate
Process_Management	.728
People_Management	.746
Information_and_Analysis	.801
Customer_Focus	.762
Strategic_Planning	.903
Leadership	.783
PIP_01	.749
PIP_02	.806
PIP_03	.628
PIP_05	.608
Ent_02	.615
Ent_03	.539
Ent_04	.744
Ent_05	.706
Prs_01	.697
Prs_02	.704
Prs_03	.567
Ppl_01	.616
Ppl_02	.690
Ppl_03	.727
Ppl_04	.553
Info_01	.679
TINFO_02	.740
TINFO_03	.630
Info_04	.638
TCUST_01	.650
Cust_02	.629
TCUST_04	.521
TCUST_06	.583
TSTR_01	.660
TSTR_02	.696
Str_03	.538
TLEAD_01	.641
TLEAD_02	.676
Lead_04	.576

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	67	568.683	368	.000	1.545
Saturated model	435	.000	0		
Independence model	29	4898.382	406	.000	12.065

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.055	.850	.823	.719
Saturated model	.000	1.000		
Independence model	.485	.141	.080	.132

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.884	.872	.956	.951	.955
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.906	.801	.866
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	200.683	140.102	269.212
Saturated model	.000	.000	.000
Independence model	4492.382	4270.512	4721.533

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.573	.908	.634	1.218
Saturated model	.000	.000	.000	.000
Independence model	22.165	20.328	19.324	21.364

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.050	.042	.058	.518
Independence model	.224	.218	.229	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	702.683	723.731	930.663	997.663
Saturated model	870.000	1006.649	2350.165	2785.165
Independence model	4956.382	4965.492	5055.060	5084.060

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	3.180	2.905	3.490	3.275
Saturated model	3.937	3.937	3.937	4.555
Independence model	22.427	21.423	23.464	22.468

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	161	169
Independence model	21	22

APPENDIX F

Harman's Single Factor Test Results

APPENDIX F

Results from the Full Measurement Model

Communalities

	Initial	Extraction
Ent_02	1.000	.647
Ent_03	1.000	.623
Ent_04	1.000	.764
Ent_05	1.000	.699
PIP_01	1.000	.705
PIP_02	1.000	.755
PIP_03	1.000	.702
PIP_05	1.000	.631
TLEAD_01	1.000	.595
TLEAD_02	1.000	.652
Lead_04	1.000	.581
TSTR_01	1.000	.673
TSTR_02	1.000	.689
Str_03	1.000	.564
TCUST_01	1.000	.634
Cust_02	1.000	.697
TCUST_04	1.000	.694
TCUST_06	1.000	.583
Info_01	1.000	.690
TINFO_02	1.000	.709
TINFO_03	1.000	.647
Info_04	1.000	.655
Ppl_01	1.000	.669
Ppl_02	1.000	.626
Ppl_03	1.000	.653
Ppl_04	1.000	.543
Prs_01	1.000	.676
Prs_02	1.000	.606
Prs_03	1.000	.522

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.746	47.400	47.400	13.746	47.400	47.400
2	2.838	9.788	57.188	2.838	9.788	57.188
3	1.224	4.220	61.408	1.224	4.220	61.408
4	1.074	3.705	65.113	1.074	3.705	65.113
5	.997	3.439	68.551			
6	.960	3.312	71.863			
7	.741	2.556	74.419			
8	.657	2.265	76.684			
9	.556	1.918	78.602			
10	.539	1.860	80.461			
11	.478	1.647	82.109			
12	.468	1.614	83.723			
13	.440	1.518	85.242			
14	.419	1.445	86.687			
15	.393	1.354	88.041			
16	.378	1.303	89.344			
17	.324	1.116	90.460			
18	.318	1.097	91.557			
19	.302	1.040	92.596			
20	.285	.983	93.579			
21	.263	.906	94.485			
22	.237	.816	95.301			
23	.230	.793	96.095			
24	.219	.755	96.850			
25	.217	.749	97.599			
26	.206	.709	98.308			
27	.174	.599	98.907			
28	.167	.578	99.485			
29	.149	.515	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component			
	1	2	3	4
Ent_02	.481	.631	.060	.115
Ent_03	.425	.651	.054	.126
Ent_04	.484	.705	.107	.149
Ent_05	.536	.625	-.016	.147
PIP_01	.698	.394	-.093	-.232
PIP_02	.727	.364	-.202	-.229
PIP_03	.649	.402	-.196	-.285
PIP_05	.693	.238	-.189	-.241
TLEAD_01	.703	.006	.250	.195
TLEAD_02	.732	.005	.244	.240
Lead_04	.724	.038	.202	.119
TSTR_01	.778	-.108	.238	.020
TSTR_02	.765	-.199	.219	.125
Str_03	.681	-.232	.216	.005
TCUST_01	.719	-.138	.281	-.135
Cust_02	.706	-.057	.321	-.304
TCUST_04	.623	-.165	.394	-.351
TCUST_06	.710	-.203	.075	-.182
Info_01	.751	-.144	-.192	.262
TINFO_02	.776	-.101	-.136	.279
TINFO_03	.715	-.205	-.015	.305
Info_04	.754	-.144	-.118	.228
Ppl_01	.724	-.156	-.344	.037
Ppl_02	.733	-.192	-.208	-.094
Ppl_03	.757	-.166	-.200	-.109
Ppl_04	.659	-.145	-.225	-.190
Prs_01	.729	-.254	-.277	.063
Prs_02	.683	-.335	-.164	.038
Prs_03	.684	-.213	.020	-.087

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

APPENDIX G

Results for the Structural Model

APPENDIX G

Results for the Structural Model

Unstandardized Regression Weights

			Estimate	S.E.	C.R.	P
Leadership	<---	Quality_Mgmt_Practices	1.000			
Strategic_Planning	<---	Quality_Mgmt_Practices	.954	.098	9.702	***
Customer_Focus	<---	Quality_Mgmt_Practices	.434	.046	9.475	***
Information_and_Analysis	<---	Quality_Mgmt_Practices	1.206	.120	10.068	***
People_Management	<---	Quality_Mgmt_Practices	.933	.101	9.270	***
Process_Management	<---	Quality_Mgmt_Practices	.902	.098	9.205	***
Product_Innovation_Perf	<---	Quality_Mgmt_Practices	.599	.084	7.120	***
Product_Innovation_Perf	<---	Entrepreneurial_Orientation	.475	.067	7.066	***
Lead_04	<---	Leadership	1.000			
TLEAD_02	<---	Leadership	.425	.035	12.184	***
TLEAD_01	<---	Leadership	.435	.037	11.858	***
Str_03	<---	Strategic_Planning	1.000			
TSTR_02	<---	Strategic_Planning	.438	.036	12.213	***
TSTR_01	<---	Strategic_Planning	.482	.041	11.889	***
TCUST_06	<---	Customer_Focus	1.000			
TCUST_04	<---	Customer_Focus	.772	.072	10.758	***
Cust_02	<---	Customer_Focus	1.922	.161	11.945	***
TCUST_01	<---	Customer_Focus	.925	.076	12.158	***
Info_04	<---	Information_and_Analysis	1.000			
TINFO_03	<---	Information_and_Analysis	.328	.025	13.029	***
TINFO_02	<---	Information_and_Analysis	.368	.025	14.485	***
Info_01	<---	Information_and_Analysis	.841	.061	13.681	***
Ppl_04	<---	People_Management	1.000			
Ppl_03	<---	People_Management	1.091	.086	12.701	***
Ppl_02	<---	People_Management	1.076	.087	12.361	***
Ppl_01	<---	People_Management	1.059	.091	11.639	***
Prs_03	<---	Process_Management	1.000			
Prs_02	<---	Process_Management	1.231	.100	12.362	***
Prs_01	<---	Process_Management	1.237	.101	12.305	***
Ent_05	<---	Entrepreneurial_Orientation	1.000			
Ent_04	<---	Entrepreneurial_Orientation	.992	.066	15.040	***
Ent_03	<---	Entrepreneurial_Orientation	.755	.062	12.114	***
Ent_02	<---	Entrepreneurial_Orientation	.899	.068	13.269	***
PIP_05	<---	Product_Innovation_Perf	1.000			
PIP_03	<---	Product_Innovation_Perf	.856	.068	12.666	***
PIP_02	<---	Product_Innovation_Perf	.985	.067	14.766	***
PIP_01	<---	Product_Innovation_Perf	.918	.065	14.129	***

Standardized Regression Weights

			Estimate
Leadership	<---	Quality_Mgmt_Practices	.885
Strategic_Planning	<---	Quality_Mgmt_Practices	.950
Customer_Focus	<---	Quality_Mgmt_Practices	.873

			Estimate
Information_and_Analysis	<---	Quality_Mgmt_Practices	.895
People_Management	<---	Quality_Mgmt_Practices	.864
Process_Management	<---	Quality_Mgmt_Practices	.853
Product_Innovation_Perf	<---	Quality_Mgmt_Practices	.508
Product_Innovation_Perf	<---	Entrepreneurial_Orientation	.452
Lead_04	<---	Leadership	.759
TLEAD_02	<---	Leadership	.822
TLEAD_01	<---	Leadership	.800
Str_03	<---	Strategic_Planning	.734
TSTR_02	<---	Strategic_Planning	.834
TSTR_01	<---	Strategic_Planning	.812
TCUST_06	<---	Customer_Focus	.764
TCUST_04	<---	Customer_Focus	.722
Cust_02	<---	Customer_Focus	.793
TCUST_01	<---	Customer_Focus	.806
Info_04	<---	Information_and_Analysis	.799
TINFO_03	<---	Information_and_Analysis	.794
TINFO_02	<---	Information_and_Analysis	.861
Info_01	<---	Information_and_Analysis	.824
Ppl_04	<---	People_Management	.744
Ppl_03	<---	People_Management	.853
Ppl_02	<---	People_Management	.831
Ppl_01	<---	People_Management	.785
Prs_03	<---	Process_Management	.753
Prs_02	<---	Process_Management	.839
Prs_01	<---	Process_Management	.835
Ent_05	<---	Entrepreneurial_Orientation	.840
Ent_04	<---	Entrepreneurial_Orientation	.862
Ent_03	<---	Entrepreneurial_Orientation	.734
Ent_02	<---	Entrepreneurial_Orientation	.784
PIP_05	<---	Product_Innovation_Perf	.780
PIP_03	<---	Product_Innovation_Perf	.792
PIP_02	<---	Product_Innovation_Perf	.898
PIP_01	<---	Product_Innovation_Perf	.865

Squared Multiple Correlations

	Estimate
Product_Innovation_Perf	.671
Process_Management	.728
People_Management	.746
Information_and_Analysis	.801
Customer_Focus	.762
Strategic_Planning	.903
Leadership	.783
PIP_01	.749

	Estimate
PIP_02	.806
PIP_03	.628
PIP_05	.608
Ent_02	.615
Ent_03	.539
Ent_04	.744
Ent_05	.706
Prs_01	.697
Prs_02	.704
Prs_03	.567
Ppl_01	.616
Ppl_02	.690
Ppl_03	.727
Ppl_04	.553
Info_01	.679
TINFO_02	.740
TINFO_03	.630
Info_04	.638
TCUST_01	.650
Cust_02	.629
TCUST_04	.521
TCUST_06	.583
TSTR_01	.660
TSTR_02	.696
Str_03	.538
TLEAD_01	.641
TLEAD_02	.676
Lead_04	.576

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	67	568.683	368	.000	1.545
Saturated model	435	.000	0		
Independence model	29	4898.382	406	.000	12.065

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.055	.850	.823	.719
Saturated model	.000	1.000		
Independence model	.485	.141	.080	.132

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.884	.872	.956	.951	.955
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.906	.801	.866
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	200.683	140.102	269.212
Saturated model	.000	.000	.000
Independence model	4492.382	4270.512	4721.533

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.573	.908	.634	1.218
Saturated model	.000	.000	.000	.000
Independence model	22.165	20.328	19.324	21.364

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.050	.042	.058	.518
Independence model	.224	.218	.229	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	702.683	723.731	930.663	997.663
Saturated model	870.000	1006.649	2350.165	2785.165
Independence model	4956.382	4965.492	5055.060	5084.060

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	3.180	2.905	3.490	3.275
Saturated model	3.937	3.937	3.937	4.555
Independence model	22.427	21.423	23.464	22.468

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	161	169
Independence model	21	22

APPENDIX H

Results for the Measurement Model with Moderator Variables

APPENDIX H

Results for the Measurement Model with Moderator Variables

Unstandardized Regression Weights

			Estimate	S.E.	C.R.	P
Process_Management	<---	QMP2nd	.735	.073	10.029	***
People_Management	<---	QMP2nd	.752	.075	10.018	***
Information_and_Analysis	<---	QMP2nd	1.000			
Customer_Focus	<---	QMP2nd	.892	.087	10.271	***
Strategic_Planning	<---	QMP2nd	.728	.072	10.144	***
Leadership	<---	QMP2nd	.784	.078	10.089	***
Lead_04	<---	Leadership	1.000			
Lead_02	<---	Leadership	1.018	.078	13.053	***
Lead_01	<---	Leadership	.956	.076	12.607	***
Str_03	<---	Strategic_Planning	1.000			
Str_02	<---	Strategic_Planning	1.181	.099	11.955	***
Str_01	<---	Strategic_Planning	1.326	.110	12.059	***
Cust_06	<---	Customer_Focus	1.000			
Cust_04	<---	Customer_Focus	.741	.065	11.372	***
Cust_02	<---	Customer_Focus	.742	.061	12.104	***
Cust_01	<---	Customer_Focus	.777	.064	12.183	***
Info_04	<---	Information_and_Analysis	1.000			
Info_03	<---	Information_and_Analysis	.748	.059	12.676	***
Info_02	<---	Information_and_Analysis	.932	.066	14.105	***
Info_01	<---	Information_and_Analysis	.828	.060	13.904	***
Ppl_04	<---	People_Management	1.000			
Ppl_03	<---	People_Management	1.101	.087	12.632	***
Ppl_02	<---	People_Management	1.077	.088	12.194	***
Ppl_01	<---	People_Management	1.073	.092	11.646	***
Prs_03	<---	Process_Management	1.000			
Prs_02	<---	Process_Management	1.235	.100	12.302	***
Prs_01	<---	Process_Management	1.250	.101	12.331	***
Ent_05	<---	Entrepreneurial_Orientation	1.000			
Ent_04	<---	Entrepreneurial_Orientation	.988	.066	15.068	***
Ent_03	<---	Entrepreneurial_Orientation	.753	.062	12.131	***
Ent_02	<---	Entrepreneurial_Orientation	.900	.067	13.359	***
PIP_05	<---	Product_Innovation_Perf	1.000			
PIP_03	<---	Product_Innovation_Perf	.863	.068	12.755	***
PIP_02	<---	Product_Innovation_Perf	.987	.067	14.769	***
PIP_01	<---	Product_Innovation_Perf	.916	.065	14.069	***
Unfair_04	<---	marketunfair	1.000			
Unfair_03	<---	marketunfair	1.214	.087	13.892	***
Unfair_02	<---	marketunfair	1.220	.095	12.799	***
Unfair_01	<---	marketunfair	1.058	.100	10.528	***
Support_04	<---	policysupport	1.000			
Support_03	<---	policysupport	1.008	.067	14.951	***
Support_02	<---	policysupport	.920	.064	14.476	***
Support_01	<---	policysupport	.604	.070	8.643	***
Intens_06	<---	intensity	1.000			
Intens_05	<---	intensity	2.316	.461	5.026	***
Intens_04	<---	intensity	2.233	.456	4.894	***
Intens_03	<---	intensity	2.707	.528	5.124	***
Intens_02	<---	intensity	2.711	.532	5.095	***
Intens_01	<---	intensity	2.502	.499	5.017	***

Standardized Regression Weights

			Estimate
Process_Management	<---	QMP2nd	.871
People_Management	<---	QMP2nd	.873
Information_and_Analysis	<---	QMP2nd	.911
Customer_Focus	<---	QMP2nd	.863
Strategic_Planning	<---	QMP2nd	.923
Leadership	<---	QMP2nd	.832
Lead_04	<---	Leadership	.789
Lead_02	<---	Leadership	.826
Lead_01	<---	Leadership	.802
Str_03	<---	Strategic_Planning	.718
Str_02	<---	Strategic_Planning	.831
Str_01	<---	Strategic_Planning	.838
Cust_06	<---	Customer_Focus	.773
Cust_04	<---	Customer_Focus	.751
Cust_02	<---	Customer_Focus	.793
Cust_01	<---	Customer_Focus	.798
Info_04	<---	Information_and_Analysis	.811
Info_03	<---	Information_and_Analysis	.769
Info_02	<---	Information_and_Analysis	.832
Info_01	<---	Information_and_Analysis	.824
Ppl_04	<---	People_Management	.739
Ppl_03	<---	People_Management	.855
Ppl_02	<---	People_Management	.826
Ppl_01	<---	People_Management	.791
Prs_03	<---	Process_Management	.749
Prs_02	<---	Process_Management	.837
Prs_01	<---	Process_Management	.840
Ent_05	<---	Entrepreneurial_Orientation	.841
Ent_04	<---	Entrepreneurial_Orientation	.860
Ent_03	<---	Entrepreneurial_Orientation	.733
Ent_02	<---	Entrepreneurial_Orientation	.786
PIP_05	<---	Product_Innovation_Perf	.778
PIP_03	<---	Product_Innovation_Perf	.797
PIP_02	<---	Product_Innovation_Perf	.898
PIP_01	<---	Product_Innovation_Perf	.862
Unfair_04	<---	marketunfair	.772
Unfair_03	<---	marketunfair	.910
Unfair_02	<---	marketunfair	.824
Unfair_01	<---	marketunfair	.695
Support_04	<---	policysupport	.883
Support_03	<---	policysupport	.836
Support_02	<---	policysupport	.815
Support_01	<---	policysupport	.555
Intens_06	<---	intensity	.356
Intens_05	<---	intensity	.722

			Estimate
Intens_04	<---	intensity	.684
Intens_03	<---	intensity	.788
Intens_02	<---	intensity	.800
Intens_01	<---	intensity	.717

Covariances

			Estimate	S.E.	C.R.	P
Entrepreneurial_Orientation	<-->	Product_Innovation_Perf	.682	.099	6.916	***
Entrepreneurial_Orientation	<-->	QMP2nd	.480	.092	5.241	***
Entrepreneurial_Orientation	<-->	marketunfair	-.072	.100	-.721	.471
Entrepreneurial_Orientation	<-->	policysupport	-.092	.109	-.847	.397
Entrepreneurial_Orientation	<-->	intensity	.018	.033	.546	.585
Product_Innovation_Perf	<-->	QMP2nd	.795	.116	6.863	***
Product_Innovation_Perf	<-->	marketunfair	-.053	.103	-.508	.611
Product_Innovation_Perf	<-->	policysupport	.316	.116	2.729	.006
Product_Innovation_Perf	<-->	intensity	.014	.034	.417	.676
QMP2nd	<-->	marketunfair	-.059	.109	-.539	.590
QMP2nd	<-->	policysupport	.101	.119	.854	.393
QMP2nd	<-->	intensity	.054	.037	1.468	.142
marketunfair	<-->	policysupport	.097	.150	.646	.518
marketunfair	<-->	intensity	.158	.055	2.855	.004
policysupport	<-->	intensity	.022	.049	.457	.648
e6	<-->	e7	.128	.033	3.860	***
e22	<-->	e24	-.430	.087	-4.968	***

Correlations

			Estimate
Entrepreneurial_Orientation	<-->	Product_Innovation_Perf	.683
Entrepreneurial_Orientation	<-->	QMP2nd	.454
Entrepreneurial_Orientation	<-->	marketunfair	-.054
Entrepreneurial_Orientation	<-->	policysupport	-.064
Entrepreneurial_Orientation	<-->	intensity	.041
Product_Innovation_Perf	<-->	QMP2nd	.718
Product_Innovation_Perf	<-->	marketunfair	-.038
Product_Innovation_Perf	<-->	policysupport	.210
Product_Innovation_Perf	<-->	intensity	.031
QMP2nd	<-->	marketunfair	-.040
QMP2nd	<-->	policysupport	.064
QMP2nd	<-->	intensity	.114
marketunfair	<-->	policysupport	.049
marketunfair	<-->	intensity	.263
policysupport	<-->	intensity	.035
e6	<-->	e7	.683
e22	<-->	e24	-.457

Variances

	Estimate	S.E.	C.R.	P	Label
Entrepreneurial_Orientation	.953	.128	7.454	***	
Product_Innovation_Perf	1.046	.155	6.739	***	
QMP2nd	1.173	.184	6.387	***	
marketunfair	1.855	.283	6.559	***	
policysupport	2.161	.272	7.942	***	
intensity	.194	.075	2.596	.009	
e6	.322	.065	4.965	***	
e7	.108	.033	3.274	.001	
e8	.320	.068	4.705	***	
e9	.240	.057	4.189	***	
e10	.208	.045	4.648	***	
e11	.202	.045	4.448	***	
l4	.633	.075	8.384	***	
l2	.503	.065	7.702	***	
l1	.530	.065	8.179	***	
s3	.684	.072	9.497	***	
s2	.456	.055	8.228	***	
s1	.542	.067	8.069	***	
c6	.847	.099	8.601	***	
c4	.534	.060	8.850	***	
c2	.407	.049	8.314	***	
c1	.432	.052	8.243	***	
i4	.737	.086	8.588	***	
i3	.547	.060	9.069	***	
i2	.544	.066	8.238	***	
i1	.459	.055	8.389	***	
p4	.725	.079	9.226	***	
p3	.388	.051	7.553	***	
p2	.471	.058	8.183	***	
p1	.602	.069	8.716	***	
r3	.653	.074	8.833	***	
r2	.543	.074	7.357	***	
r1	.547	.075	7.304	***	
e5	.393	.052	7.508	***	
e4	.327	.047	6.997	***	
e3	.465	.051	9.105	***	
e2	.477	.056	8.531	***	
n5	.681	.074	9.177	***	
n3	.447	.050	8.992	***	
n2	.245	.036	6.831	***	
n1	.303	.038	7.935	***	
e12	1.258	.145	8.693	***	
e13	.568	.119	4.776	***	
e14	1.310	.168	7.774	***	
e15	2.219	.236	9.402	***	

	Estimate	S.E.	C.R.	P	Label
e16	.608	.106	5.716	***	
e17	.943	.129	7.294	***	
e18	.925	.118	7.824	***	
e19	1.768	.178	9.947	***	
e20	1.339	.130	10.337	***	
e21	.956	.105	9.078	***	
e22	1.101	.129	8.559	***	
e23	.871	.106	8.239	***	
e24	.804	.113	7.134	***	
e25	1.149	.126	9.125	***	

Squared Multiple Correlations

	Estimate
Process_Management	.758
People_Management	.762
Information_and_Analysis	.830
Customer_Focus	.745
Strategic_Planning	.851
Leadership	.691
Intens_01	.514
Intens_02	.640
Intens_03	.621
Intens_04	.468
Intens_05	.522
Intens_06	.127
Support_01	.308
Support_02	.664
Support_03	.699
Support_04	.780
Unfair_01	.483
Unfair_02	.678
Unfair_03	.828
Unfair_04	.596
PIP_01	.744
PIP_02	.807
PIP_03	.635
PIP_05	.606
Ent_02	.618
Ent_03	.538
Ent_04	.740
Ent_05	.708
Prs_01	.705
Prs_02	.701
Prs_03	.561
Ppl_01	.625
Ppl_02	.682

	Estimate
Ppl_03	.731
Ppl_04	.546
Info_01	.678
Info_02	.693
Info_03	.591
Info_04	.657
Cust_01	.637
Cust_02	.629
Cust_04	.564
Cust_06	.597
Str_01	.703
Str_02	.691
Str_03	.516
Lead_01	.643
Lead_02	.683
Lead_04	.623

Modification Indices

Covariances

			M.I.	Par Change
e11	<-->	Entrepreneurial_Orientation	5.602	-.080
e10	<-->	Intensity	4.923	-.041
e8	<-->	e9	5.785	-.090
e6	<-->	Entrepreneurial_Orientation	8.210	.103
e6	<-->	e11	8.064	-.081
e25	<-->	Policysupport	7.327	-.306
e25	<-->	Product_Innovation_Perf	4.719	.111
e25	<-->	e10	4.300	-.097
e25	<-->	e6	4.715	.112
e24	<-->	Policysupport	5.106	.232
e24	<-->	e11	6.473	-.111
e23	<-->	QMP2nd	5.097	.130
e23	<-->	e11	10.857	.142
e22	<-->	e9	8.387	-.160
e22	<-->	e8	4.872	.129
e22	<-->	e25	4.028	.167
e22	<-->	e23	6.245	-.185
e21	<-->	e11	6.400	.111
e21	<-->	e25	6.406	-.199
e19	<-->	Product_Innovation_Perf	4.680	.132
e18	<-->	e19	8.230	.283
e17	<-->	Product_Innovation_Perf	5.739	-.120
e17	<-->	e24	4.514	.165
e16	<-->	e21	9.257	.210
e14	<-->	Entrepreneurial_Orientation	4.484	-.145
e13	<-->	e25	4.093	-.159
e12	<-->	Intensity	4.678	.079
e12	<-->	e8	5.785	.152
e12	<-->	e25	4.059	.186
e12	<-->	e15	6.035	.310
n1	<-->	e25	8.510	.138
n1	<-->	e19	4.908	.126
n1	<-->	e17	5.335	-.108
n3	<-->	Policysupport	4.887	.157
n3	<-->	e10	5.704	.071
n3	<-->	e13	5.152	-.112
n5	<-->	e24	12.038	.211
n5	<-->	e15	4.288	-.191
e2	<-->	e24	4.259	-.108
e2	<-->	e23	5.390	.121
e4	<-->	e11	5.584	-.068

			M.I.	Par Change
e4	<-->	e6	9.284	.093
e4	<-->	e12	8.497	.161
r1	<-->	e10	6.544	.091
r1	<-->	e9	5.626	.100
r1	<-->	e25	9.175	-.198
r1	<-->	e23	7.423	.161
r1	<-->	n1	5.611	-.085
r2	<-->	Entrepreneurial_Orientation	6.020	-.112
r2	<-->	e6	4.965	-.086
r2	<-->	e24	4.041	-.119
r2	<-->	e21	6.083	.147
r2	<-->	n3	4.652	-.089
r2	<-->	e2	7.170	-.116
r3	<-->	Marketunfair	4.834	-.179
r3	<-->	e8	5.994	.111
r3	<-->	e22	7.438	.179
r3	<-->	r1	5.273	-.112
p1	<-->	Intensity	6.106	.063
p1	<-->	e11	9.875	.112
p1	<-->	e9	4.813	.091
p1	<-->	e8	5.881	-.106
p1	<-->	e25	4.856	-.142
p1	<-->	e21	10.163	.187
p1	<-->	e15	4.322	.184
p1	<-->	e13	8.454	-.169
p1	<-->	r1	9.013	.146
p2	<-->	Marketunfair	11.291	.240
p2	<-->	e24	8.833	-.157
p2	<-->	e19	4.821	-.154
p2	<-->	e13	8.671	.156
p2	<-->	e5	4.500	.079
p3	<-->	Intensity	4.739	-.047
p3	<-->	e24	7.768	.139
p3	<-->	e21	6.058	-.123
p3	<-->	e15	11.183	-.252
p3	<-->	n2	4.635	-.062
p3	<-->	r3	9.038	-.126
p4	<-->	e9	4.808	-.097
p4	<-->	n2	5.129	.082
p4	<-->	r3	5.472	.124
i1	<-->	Marketunfair	6.954	-.184
i1	<-->	r1	5.339	.100
i2	<-->	e22	7.155	-.166
i2	<-->	i1	12.397	.142
i3	<-->	Policysupport	5.184	-.179
i3	<-->	n3	4.380	-.080

			M.I.	Par Change
i3	<-->	r2	4.673	.098
i4	<-->	p2	4.666	-.104
i4	<-->	p3	4.210	.093
i4	<-->	i1	4.108	-.094
i4	<-->	i3	10.854	.162
c1	<-->	e24	5.226	-.115
c1	<-->	e23	12.770	.179
c1	<-->	e14	4.327	-.131
c1	<-->	n5	6.835	-.112
c2	<-->	e9	4.318	-.072
c2	<-->	r2	5.042	-.091
c4	<-->	Intensity	5.320	.055
c4	<-->	e9	4.780	-.084
c4	<-->	e25	4.526	.128
c4	<-->	e23	7.680	-.150
c4	<-->	e22	9.635	.184
c4	<-->	e17	8.837	.176
c4	<-->	e16	6.009	-.128
c4	<-->	n5	6.589	.119
c4	<-->	r1	7.601	-.125
c4	<-->	r3	9.202	.140
c4	<-->	p1	4.165	-.091
c4	<-->	p3	4.848	.084
c6	<-->	e11	6.555	.109
c6	<-->	e8	4.315	-.104
c6	<-->	e6	8.409	-.132
c6	<-->	e25	5.038	-.172
c6	<-->	e16	4.902	.148
c6	<-->	r2	7.527	.158
c6	<-->	c2	6.246	-.117
s1	<-->	i2	4.355	-.094
s1	<-->	c2	6.941	.102
s2	<-->	e14	4.360	-.134
s3	<-->	QMP2nd	5.912	.119
s3	<-->	Product_Innovation_Perf	8.666	-.114
s3	<-->	e22	4.300	.135
s3	<-->	n1	6.282	-.091
s3	<-->	n2	7.391	-.094
s3	<-->	n5	4.749	.111
s3	<-->	s2	6.448	.109
l1	<-->	Product_Innovation_Perf	5.677	.086
l1	<-->	e25	9.850	.194
l1	<-->	n1	4.257	.070
l1	<-->	r2	4.305	-.096
l1	<-->	r3	4.224	.097
l1	<-->	i2	4.893	.099

			M.I.	Par Change
l1	<-->	s3	8.447	-.136
l2	<-->	e25	4.340	.128
l2	<-->	i1	8.690	-.120
l2	<-->	i4	4.705	.110
l2	<-->	c1	4.276	.082
l4	<-->	Entrepreneurial_Orientation	6.458	.119
l4	<-->	e10	4.745	.079
l4	<-->	e25	7.443	-.182
l4	<-->	e4	6.199	.099
l4	<-->	c2	6.617	.107
l4	<-->	c4	4.579	-.099

Regression Weights

			M.I.	Par Change
Process_Management	<---	Entrepreneurial_Orientation	6.183	-.114
Leadership	<---	Entrepreneurial_Orientation	12.148	.171
Intens_01	<---	policysupport	4.754	-.120
Intens_01	<---	Support_03	6.773	-.112
Intens_01	<---	Prs_01	5.565	-.132
Intens_01	<---	Ppl_01	5.144	-.137
Intens_01	<---	Lead_01	4.621	.135
Intens_02	<---	policysupport	6.178	.124
Intens_02	<---	Process_Management	5.487	-.188
Intens_02	<---	Support_03	8.858	.116
Intens_02	<---	Ent_02	5.052	-.139
Intens_02	<---	Prs_02	7.852	-.144
Intens_02	<---	Prs_03	7.982	-.160
Intens_02	<---	Ppl_02	6.106	-.141
Intens_02	<---	Cust_01	6.472	-.162
Intens_03	<---	QMP2nd	13.698	.244
Intens_03	<---	Product_Innovation_Perf	11.520	.237
Intens_03	<---	Entrepreneurial_Orientation	10.852	.245
Intens_03	<---	Process_Management	20.332	.359
Intens_03	<---	People_Management	8.566	.226
Intens_03	<---	Information_and_Analysis	14.559	.231
Intens_03	<---	Customer_Focus	10.294	.208
Intens_03	<---	Strategic_Planning	9.294	.256
Intens_03	<---	Leadership	6.411	.180
Intens_03	<---	PIP_01	9.286	.193
Intens_03	<---	PIP_02	11.792	.210
Intens_03	<---	PIP_03	4.321	.129
Intens_03	<---	Ent_02	14.199	.232
Intens_03	<---	Ent_03	6.043	.169
Intens_03	<---	Ent_04	5.631	.146

			M.I.	Par Change
Intens_03	<---	Ent_05	7.296	.160
Intens_03	<---	Prs_01	23.532	.245
Intens_03	<---	Prs_02	16.740	.209
Intens_03	<---	Prs_03	9.052	.170
Intens_03	<---	Ppl_01	5.800	.131
Intens_03	<---	Ppl_02	5.591	.134
Intens_03	<---	Info_01	9.508	.177
Intens_03	<---	Info_02	9.492	.159
Intens_03	<---	Info_03	11.201	.199
Intens_03	<---	Info_04	11.596	.160
Intens_03	<---	Cust_01	19.020	.275
Intens_03	<---	Cust_02	4.606	.141
Intens_03	<---	Str_01	6.615	.131
Intens_03	<---	Str_02	5.680	.135
Intens_03	<---	Lead_04	4.477	.112
Intens_04	<---	QMP2nd	12.268	-.254
Intens_04	<---	Product_Innovation_Perf	16.994	-.316
Intens_04	<---	Entrepreneurial_Orientation	10.623	-.266
Intens_04	<---	Process_Management	11.832	-.301
Intens_04	<---	People_Management	7.381	-.230
Intens_04	<---	Information_and_Analysis	16.387	-.269
Intens_04	<---	Customer_Focus	4.912	-.158
Intens_04	<---	Strategic_Planning	10.683	-.301
Intens_04	<---	Leadership	10.787	-.257
Intens_04	<---	Support_02	4.187	-.093
Intens_04	<---	PIP_01	12.212	-.243
Intens_04	<---	PIP_02	14.096	-.252
Intens_04	<---	PIP_03	12.051	-.237
Intens_04	<---	PIP_05	9.531	-.177
Intens_04	<---	Ent_02	8.691	-.199
Intens_04	<---	Ent_03	9.424	-.231
Intens_04	<---	Ent_04	5.229	-.154
Intens_04	<---	Ent_05	7.055	-.173
Intens_04	<---	Prs_01	13.011	-.200
Intens_04	<---	Prs_02	10.984	-.186
Intens_04	<---	Ppl_01	4.537	-.127
Intens_04	<---	Ppl_02	4.030	-.124
Intens_04	<---	Ppl_03	4.950	-.140
Intens_04	<---	Info_01	8.182	-.181
Intens_04	<---	Info_02	20.757	-.258
Intens_04	<---	Info_03	7.951	-.184
Intens_04	<---	Info_04	16.711	-.210
Intens_04	<---	Cust_02	4.601	-.154
Intens_04	<---	Str_01	11.147	-.186
Intens_04	<---	Str_02	4.308	-.129
Intens_04	<---	Lead_01	8.285	-.178

			M.I.	Par Change
Intens_04	<---	Lead_02	7.144	-.160
Intens_04	<---	Lead_04	7.352	-.158
Intens_05	<---	Process_Management	6.294	.203
Intens_05	<---	Prs_01	6.263	.128
Intens_05	<---	Prs_02	9.917	.163
Intens_05	<---	Ppl_01	7.576	.152
Intens_06	<---	Product_Innovation_Perf	5.114	-.180
Intens_06	<---	PIP_01	5.774	-.173
Intens_06	<---	PIP_02	5.754	-.167
Support_01	<---	Product_Innovation_Perf	7.958	.263
Support_01	<---	Entrepreneurial_Orientation	4.554	.211
Support_01	<---	PIP_01	11.107	.281
Support_01	<---	PIP_02	7.517	.223
Support_01	<---	PIP_03	5.058	.186
Support_01	<---	Ent_05	4.008	.158
Support_01	<---	Ppl_04	4.015	.145
Support_01	<---	Info_01	4.137	.156
Support_01	<---	Cust_01	4.666	.182
Support_01	<---	Lead_02	5.558	.172
Support_02	<---	Product_Innovation_Perf	4.047	.149
Support_02	<---	Entrepreneurial_Orientation	6.303	.197
Support_02	<---	Support_01	5.497	.107
Support_02	<---	PIP_01	6.244	.167
Support_02	<---	Ent_03	4.551	.155
Support_02	<---	Ent_04	5.421	.151
Support_02	<---	Ent_05	4.783	.137
Support_03	<---	Product_Innovation_Perf	13.046	-.276
Support_03	<---	Entrepreneurial_Orientation	12.063	-.282
Support_03	<---	PIP_01	16.253	-.279
Support_03	<---	PIP_02	12.937	-.241
Support_03	<---	PIP_03	7.975	-.192
Support_03	<---	Ent_02	10.249	-.216
Support_03	<---	Ent_03	10.404	-.242
Support_03	<---	Ent_04	7.773	-.187
Support_03	<---	Ent_05	5.735	-.155
Support_03	<---	Ppl_01	4.826	-.131
Support_03	<---	Info_02	4.250	-.117
Support_03	<---	Str_02	5.833	-.150
Support_04	<---	Intens_05	6.421	.119
Unfair_01	<---	Ppl_03	5.499	-.205
Unfair_01	<---	Info_04	4.036	-.144
Unfair_02	<---	Information_and_Analysis	4.185	.155
Unfair_02	<---	Info_03	5.268	.171
Unfair_02	<---	Info_04	5.683	.140
Unfair_02	<---	Str_01	6.019	.157
Unfair_02	<---	Str_03	4.835	.159

			M.I.	Par Change
Unfair_02	<---	Lead_02	4.096	.139
Unfair_03	<---	Intens_01	4.067	-.091
Unfair_04	<---	intensity	4.370	.407
Unfair_04	<---	Intens_01	7.547	.145
Unfair_04	<---	Intens_04	5.098	.128
PIP_01	<---	Intens_01	4.381	.057
PIP_02	<---	Str_03	5.092	-.076
PIP_03	<---	Support_04	4.780	.063
PIP_05	<---	Intens_02	10.581	.128
PIP_05	<---	Ppl_02	4.286	.100
PIP_05	<---	Ppl_03	5.090	.111
PIP_05	<---	Cust_04	4.209	.109
PIP_05	<---	Str_03	5.258	.114
Ent_04	<---	Unfair_04	6.660	.067
Ent_04	<---	Prs_03	5.347	-.086
Ent_05	<---	Ppl_02	6.092	.098
Prs_01	<---	Intens_03	4.073	.077
Prs_01	<---	Support_04	4.267	.072
Prs_01	<---	Ppl_01	6.886	.120
Prs_02	<---	Entrepreneurial_Orientation	6.944	-.163
Prs_02	<---	PIP_03	6.643	-.134
Prs_02	<---	Ent_02	12.095	-.178
Prs_02	<---	Ent_03	5.122	-.129
Prs_02	<---	Ent_04	5.288	-.118
Prs_02	<---	Lead_01	4.692	-.102
Prs_03	<---	marketunfair	4.173	-.092
Prs_03	<---	Intens_04	7.009	.108
Prs_03	<---	Cust_04	8.234	.152
Ppl_01	<---	intensity	4.993	.303
Ppl_01	<---	Intens_02	5.585	.090
Ppl_01	<---	Intens_05	13.018	.145
Ppl_01	<---	Prs_01	7.792	.116
Ppl_02	<---	marketunfair	9.581	.123
Ppl_02	<---	Support_01	4.187	-.066
Ppl_02	<---	Unfair_01	6.046	.061
Ppl_02	<---	Unfair_02	4.457	.054
Ppl_02	<---	Unfair_03	12.767	.101
Ppl_03	<---	intensity	4.360	-.241
Ppl_03	<---	Intens_01	5.429	-.073
Ppl_03	<---	Intens_03	4.871	-.070
Ppl_03	<---	Intens_04	4.742	-.073
Ppl_03	<---	Intens_05	9.206	-.104
Ppl_03	<---	Unfair_01	5.593	-.055
Ppl_03	<---	Prs_03	5.679	-.094
Ppl_04	<---	Intens_02	4.235	-.084
Ppl_04	<---	Intens_05	4.200	-.088

			M.I.	Par Change
Info_01	<---	marketunfair	5.549	-.092
Info_01	<---	Support_01	4.446	.066
Info_01	<---	Unfair_02	4.924	-.055
Info_01	<---	Unfair_03	6.289	-.069
Info_02	<---	Intens_04	5.067	-.086
Info_02	<---	Ent_03	4.364	.115
Info_03	<---	policysupport	5.643	-.091
Info_03	<---	Support_04	7.246	-.086
Info_03	<---	PIP_03	4.093	-.097
Cust_01	<---	Intens_03	6.084	.080
Cust_04	<---	intensity	6.653	.327
Cust_04	<---	marketunfair	4.415	.086
Cust_04	<---	Intens_01	9.945	.109
Cust_04	<---	Intens_02	4.056	.071
Cust_04	<---	Intens_04	10.988	.122
Cust_04	<---	Unfair_03	4.592	.062
Cust_04	<---	Prs_01	4.628	-.084
Cust_04	<---	Info_01	4.255	-.091
Cust_06	<---	Intens_01	4.501	-.093
Cust_06	<---	Prs_02	7.439	.137
Str_01	<---	Intens_04	4.346	-.080
Str_03	<---	PIP_01	6.512	-.137
Str_03	<---	PIP_02	6.154	-.128
Lead_01	<---	Str_03	4.405	-.096
Lead_02	<---	Intens_01	5.889	.086
Lead_04	<---	Entrepreneurial_Orientation	4.181	.130
Lead_04	<---	Intens_01	4.128	-.078
Lead_04	<---	Support_02	4.149	.072
Lead_04	<---	Ent_04	7.507	.144

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	109	1319.703	837	.000	1.577
Saturated model	946	.000	0		
Independence model	43	7095.543	903	.000	7.858

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.115	.785	.757	.694
Saturated model	.000	1.000		
Independence model	.552	.177	.138	.169

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.814	.799	.923	.916	.922
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.927	.755	.855
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	482.703	387.878	585.447
Saturated model	.000	.000	.000
Independence model	6192.543	5927.688	6463.961

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	5.972	2.184	1.755	2.649
Saturated model	.000	.000	.000	.000
Independence model	32.107	28.021	26.822	29.249

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.051	.046	.056	.362
Independence model	.176	.172	.180	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	1537.703	1591.895	1908.594	2017.594
Saturated model	1892.000	2362.328	5110.933	6056.933
Independence model	7181.543	7202.921	7327.858	7370.858

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	6.958	6.529	7.423	7.203
Saturated model	8.561	8.561	8.561	10.689
Independence model	32.496	31.297	33.724	32.592

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	152	157
Independence model	31	32

APPENDIX I

Results for the Path Analysis Moderator Model

APPENDIX I

Results for the Path Analysis Moderator Model

Unstandardized Regression Weights

			Estimate	S.E.	C.R.	P
ZProduct_Innovation_Perf	<---	intens_X_QMP	-.037	.037	-.996	.319
ZProduct_Innovation_Perf	<---	intens_X_EO	.064	.039	1.654	.098
ZProduct_Innovation_Perf	<---	unfair_X_EO	-.062	.037	-1.688	.091
ZProduct_Innovation_Perf	<---	unfair_X_QMP	.082	.036	2.271	.023
ZProduct_Innovation_Perf	<---	policysupport_X_QMP	.011	.031	.353	.724
ZProduct_Innovation_Perf	<---	Zpolicysupport	.243	.029	8.266	***
ZProduct_Innovation_Perf	<---	policysupport_X_EO	-.120	.035	-3.419	***
ZProduct_Innovation_Perf	<---	Zmarketunfair	.016	.031	.512	.609
ZProduct_Innovation_Perf	<---	Zintensity	-.076	.031	-2.475	.013
ZProduct_Innovation_Perf	<---	ZQMP2nd	.507	.034	14.767	***
ZProduct_Innovation_Perf	<---	ZEntrepreneurial_Orientation	.495	.034	14.614	***

Standardized Regression Weights

			Estimate
ZProduct_Innovation_Perf	<---	intens_X_QMP	-.037
ZProduct_Innovation_Perf	<---	intens_X_EO	.061
ZProduct_Innovation_Perf	<---	unfair_X_EO	-.064
ZProduct_Innovation_Perf	<---	unfair_X_QMP	.087
ZProduct_Innovation_Perf	<---	policysupport_X_QMP	.011
ZProduct_Innovation_Perf	<---	Zpolicysupport	.243
ZProduct_Innovation_Perf	<---	policysupport_X_EO	-.111
ZProduct_Innovation_Perf	<---	Zmarketunfair	.016
ZProduct_Innovation_Perf	<---	Zintensity	-.076
ZProduct_Innovation_Perf	<---	ZQMP2nd	.507
ZProduct_Innovation_Perf	<---	ZEntrepreneurial_Orientation	.495

Covariances

			Estimate	S.E.	C.R.	P
policysupport_X_QMP	<-->	policysupport_X_EO	.379	.069	5.492	***
unfair_X_QMP	<-->	policysupport_X_EO	.140	.066	2.110	.035
unfair_X_EO	<-->	policysupport_X_EO	.126	.064	1.970	.049
intens_X_EO	<-->	policysupport_X_EO	.125	.060	2.086	.037
intens_X_QMP	<-->	policysupport_X_EO	.084	.062	1.345	.179
Zpolicysupport	<-->	policysupport_X_EO	.162	.063	2.576	.010
policysupport_X_EO	<-->	Zmarketunfair	.072	.062	1.164	.245

			Estimate	S.E.	C.R.	P
policysupport_X_EO	<-->	Zintensity	-.023	.062	-.365	.715
policysupport_X_EO	<-->	ZQMP2nd	-.007	.062	-.120	.904
policysupport_X_EO	<-->	ZEntrepreneurial_Orientation	-.116	.062	-1.855	.064
unfair_X_QMP	<-->	policysupport_X_QMP	-.006	.074	-.080	.936
unfair_X_EO	<-->	policysupport_X_QMP	.147	.072	2.052	.040
intens_X_EO	<-->	policysupport_X_QMP	.072	.067	1.087	.277
intens_X_QMP	<-->	policysupport_X_QMP	.002	.070	.025	.980
policysupport_X_QMP	<-->	Zpolicysupport	.073	.070	1.048	.295
policysupport_X_QMP	<-->	Zmarketunfair	.088	.070	1.265	.206
policysupport_X_QMP	<-->	Zintensity	.020	.069	.289	.773
policysupport_X_QMP	<-->	ZQMP2nd	.080	.070	1.155	.248
policysupport_X_QMP	<-->	ZEntrepreneurial_Orientation	-.007	.069	-.107	.914
unfair_X_EO	<-->	unfair_X_QMP	.589	.083	7.118	***
intens_X_EO	<-->	unfair_X_QMP	.019	.068	.281	.779
intens_X_QMP	<-->	unfair_X_QMP	.247	.073	3.383	***
unfair_X_QMP	<-->	Zpolicysupport	.088	.071	1.237	.216
unfair_X_QMP	<-->	Zmarketunfair	.159	.072	2.214	.027
unfair_X_QMP	<-->	Zintensity	.160	.072	2.224	.026
unfair_X_QMP	<-->	ZQMP2nd	.013	.071	.183	.855
unfair_X_QMP	<-->	ZEntrepreneurial_Orientation	-.095	.071	-1.334	.182
intens_X_EO	<-->	unfair_X_EO	.181	.067	2.715	.007
intens_X_QMP	<-->	unfair_X_EO	.024	.069	.356	.722
unfair_X_EO	<-->	Zpolicysupport	.072	.069	1.052	.293
unfair_X_EO	<-->	Zmarketunfair	.032	.069	.473	.636
unfair_X_EO	<-->	Zintensity	.089	.069	1.296	.195
unfair_X_EO	<-->	ZQMP2nd	-.095	.069	-1.383	.167
unfair_X_EO	<-->	ZEntrepreneurial_Orientation	-.015	.069	-.226	.821
intens_X_QMP	<-->	intens_X_EO	.521	.073	7.117	***
intens_X_EO	<-->	Zpolicysupport	-.023	.064	-.353	.724
intens_X_EO	<-->	Zmarketunfair	.089	.064	1.384	.166
intens_X_EO	<-->	Zintensity	.108	.065	1.668	.095
intens_X_EO	<-->	ZQMP2nd	-.065	.064	-1.006	.314
intens_X_EO	<-->	ZEntrepreneurial_Orientation	-.008	.064	-.132	.895
intens_X_QMP	<-->	Zpolicysupport	.020	.067	.299	.765
intens_X_QMP	<-->	Zmarketunfair	.160	.068	2.350	.019
intens_X_QMP	<-->	Zintensity	.134	.068	1.978	.048
intens_X_QMP	<-->	ZQMP2nd	-.016	.067	-.241	.810
intens_X_QMP	<-->	ZEntrepreneurial_Orientation	-.065	.067	-.962	.336
Zpolicysupport	<-->	Zmarketunfair	.053	.067	.794	.427
Zpolicysupport	<-->	Zintensity	.038	.067	.564	.572
Zpolicysupport	<-->	ZQMP2nd	.071	.067	1.057	.291
Zpolicysupport	<-->	ZEntrepreneurial_Orientation	-.067	.067	-.993	.321
Zmarketunfair	<-->	Zintensity	.288	.070	4.125	***
Zmarketunfair	<-->	ZQMP2nd	-.043	.067	-.639	.523
Zmarketunfair	<-->	ZEntrepreneurial_Orientation	-.059	.067	-.885	.376
Zintensity	<-->	ZQMP2nd	.123	.067	1.819	.069
Zintensity	<-->	ZEntrepreneurial_Orientation	.045	.067	.673	.501
ZQMP2nd	<-->	ZEntrepreneurial_Orientation	.496	.075	6.628	***

Correlations

			Estimate
policysupport_X_QMP	<-->	policysupport_X_EO	.398
unfair_X_QMP	<-->	policysupport_X_EO	.143
unfair_X_EO	<-->	policysupport_X_EO	.134
intens_X_EO	<-->	policysupport_X_EO	.142
intens_X_QMP	<-->	policysupport_X_EO	.091
Zpolicysupport	<-->	policysupport_X_EO	.176
policysupport_X_EO	<-->	Zmarketunfair	.079
policysupport_X_EO	<-->	Zintensity	-.025
policysupport_X_EO	<-->	ZQMP2nd	-.008
policysupport_X_EO	<-->	ZEntrepreneurial_Orientation	-.126
unfair_X_QMP	<-->	policysupport_X_QMP	-.005
unfair_X_EO	<-->	policysupport_X_QMP	.139
intens_X_EO	<-->	policysupport_X_QMP	.073
intens_X_QMP	<-->	policysupport_X_QMP	.002
policysupport_X_QMP	<-->	Zpolicysupport	.071
policysupport_X_QMP	<-->	Zmarketunfair	.085
policysupport_X_QMP	<-->	Zintensity	.019
policysupport_X_QMP	<-->	ZQMP2nd	.078
policysupport_X_QMP	<-->	ZEntrepreneurial_Orientation	-.007
unfair_X_EO	<-->	unfair_X_QMP	.545
intens_X_EO	<-->	unfair_X_QMP	.019
intens_X_QMP	<-->	unfair_X_QMP	.234
unfair_X_QMP	<-->	Zpolicysupport	.083
unfair_X_QMP	<-->	Zmarketunfair	.151
unfair_X_QMP	<-->	Zintensity	.151
unfair_X_QMP	<-->	ZQMP2nd	.012
unfair_X_QMP	<-->	ZEntrepreneurial_Orientation	-.090
intens_X_EO	<-->	unfair_X_EO	.186
intens_X_QMP	<-->	unfair_X_EO	.024
unfair_X_EO	<-->	Zpolicysupport	.071
unfair_X_EO	<-->	Zmarketunfair	.032
unfair_X_EO	<-->	Zintensity	.088
unfair_X_EO	<-->	ZQMP2nd	-.093
unfair_X_EO	<-->	ZEntrepreneurial_Orientation	-.015
intens_X_QMP	<-->	intens_X_EO	.545
intens_X_EO	<-->	Zpolicysupport	-.024
intens_X_EO	<-->	Zmarketunfair	.093
intens_X_EO	<-->	Zintensity	.113
intens_X_EO	<-->	ZQMP2nd	-.068
intens_X_EO	<-->	ZEntrepreneurial_Orientation	-.009
intens_X_QMP	<-->	Zpolicysupport	.020
intens_X_QMP	<-->	Zmarketunfair	.160
intens_X_QMP	<-->	Zintensity	.134
intens_X_QMP	<-->	ZQMP2nd	-.016
intens_X_QMP	<-->	ZEntrepreneurial_Orientation	-.065
Zpolicysupport	<-->	Zmarketunfair	.053
Zpolicysupport	<-->	Zintensity	.038
Zpolicysupport	<-->	ZQMP2nd	.071
Zpolicysupport	<-->	ZEntrepreneurial_Orientation	-.067
Zmarketunfair	<-->	Zintensity	.289
Zmarketunfair	<-->	ZQMP2nd	-.043
Zmarketunfair	<-->	ZEntrepreneurial_Orientation	-.060
Zintensity	<-->	ZQMP2nd	.123

			Estimate
Zintensity	<-->	ZEntrepreneurial_Orientation	.045
ZQMP2nd	<-->	ZEntrepreneurial_Orientation	.498

Variances

	Estimate	S.E.	C.R.	P	Label
intens_X_QMP	1.000	.095	10.512	***	
intens_X_EO	.914	.087	10.512	***	
unfair_X_EO	1.042	.099	10.512	***	
unfair_X_QMP	1.119	.106	10.512	***	
policysupport_X_QMP	1.069	.102	10.512	***	
Zpolicysupport	.995	.095	10.512	***	
policysupport_X_EO	.851	.081	10.512	***	
Zmarketunfair	.995	.095	10.512	***	
Zintensity	.995	.095	10.512	***	
ZQMP2nd	.995	.095	10.512	***	
ZEntrepreneurial_Orientation	.995	.095	10.512	***	
e1	.179	.017	10.512	***	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
ZProduct_Innovation_Perf	.820

Appendix J

Survey Instrument

Part A

7 point Likert scale, 1 = totally disagree, 4 = neutral and 7 = totally agree

Quality management practices (QMP)

Leadership

Senior executive share similar beliefs about the future direction of the company
Senior managers actively encourage a culture of improvement & innovation by trying new ideas
Employees are encouraged to help the organization implement changes.
We've eliminated barriers between individuals and departments with a strong sense of unity

Strategic planning

Our mission statement is communicated throughout the company and well supported by staff
Our planning process is comprehensive and structured with regualry short and long term reviews
Our plans, policies and objectives always include all the stakeholders' needs, includimg the society's
There is a written statement of strategy for all business operartions and is agreed by senior managers

Customer focus

We actively and regularly seek customer imputs to identify their needs and expectations
Customer needs and expectations are effectively disseminated and understood by all staff
We involve customer in our product design proess
We maintain a close relationship with our customers and provide them an easy feedback channel
We have an effective process for resolving customers' complaints
We systematically and regualry measure customer satisfaction

Information and analysis

Our company has an effective perromance measurement system to track organizational results
Updated data and information of compnay's performance is always readily available for all users
Senior management regaulary has performance review meetings and uses them for decision-making
We actively benachmark our performance against the 'best practive' and our strongest competitors

People management

We have an organizational-wide training and development process for emolyees
Our company has maintained boht top-down and bottom-up communication processes
Employee satisfaction is formally and regularly measured
Employee flexibility, multiskilling and training are actively used to improve employee performance
We alweays maintain a work environment that ensures the health, safety and well-being of all staff

Process management

The conmcpet of internal customer is well understoof by all staff
We design provesses in our plants to be fool-proof
We have clear, standardized and documented process instructions which are followed by all
We extensively use statisitcal techniques (e.g. SPC) to improve proesses and to reduce defects
We strive to establish long term relationships with suppliers
We use an ongoing supplier rating system to select our suppliers and monitor their performance

Entreprenrueial Orietnation

We actively build our capacity to react effectively to market changes
We ensure that our advanatges can withstand changes in the industry
We activeluy prepare for changes brought by China's 12th 5 Year Plan (2011-2015) for innovation and hi-tech industrial development
We are ready to face the challenges brought by the environmental proteaction demands
We are ready to face the challenges brought by the emergence of disruptive technologies

7 point Likert scale, 1 = poor, 4 = average and 7 = excellent

Product Innovation performance

The level of newness (novelty) of our firm's new products
The use of latest technological innovations in our new products
The speed of our new product development
The number of new products our firm has introduced to the market
The number of our new products that is first-to-market (early market entrants)

7 point Likert scale, 1 = totally disagree, 4 = neutral and 7 = totally agree

Market Unfairness

Unlawful competitive practices scuh as illegal copying of our products are very common
Our products and trademarks are counterfeited by other firms
Legal systems are ineffective to protect your firm's intellectual property
There is an increase in unfair practices by other firms in the industry

Policy support

Implemented polcies and programmes that have been beneficial to your firm;s operartions
Provided needed technology information and support to your firm
Played a significant role in providing financial support to your firms
Helped your firm to obtain licenses for imports of technology and equipment

Compeittion Intensity

Competition in our industry is cut-throat
There are many promotion wars in our industry
Anything that one competitor can offer, others can match easily and quickly
Price competition is a hallmark of our industry
One hears of a new competitive move almost every day
Our competitors are strong

Part B

1. How many employees in your company in total (both in China and Hong Kong)?

☐ 100 or below ☐ 101 to 500 ☐ 501 to 1,000 ☐ 1,001 to 2,000
☐ 2,001 to 5,000 ☐ 5,000 to 10,000 ☐ 10,001 or above

2. Which types of products does your company design and develop (can be more than one type)?

☐ components
☐ subassemblies parts
☐ electrical and power machinery
☐ computer accessories
☐ household appliances
☐ consumer electronics
☐ testing and measurement equipment
☐ telecommunication devices and peripherals
☐ medical and healthcare equipment
☐ IT and computers hardware
☐ industrial and manufacturing electronics
☐ semiconductors/circuit broads

3. What is/are the reasons that your company involves in new product development (can be more than one reason)?

☐ We engage in Original Design Manufacturing (ODM) business
☐ New markets
☐ Extend life of products with declining sales
☐ Make best use of our expertise and technology
☐ Top management's vision and decision
☐ Adapt to changing customers' requirements

4. What are the risks that your company expects in China in the near future (can be more than one type)?

☐ Rising operations costs
☐ Problems from customers' receivables
☐ Downward pressure for price from customers
☐ Intellectual property protection
☐ Confusing policies
☐ Pressure for compliance to stringent policies
☐ Increase in competition
☐ Lack of demands from customers
☐ Others

5. What are the opportunities that your company expects from operating in China (can be more than one type)?

☐ Demands from 'green sectors' in the 12th 5 Year Plan
☐ Demands from urbanization 'rise of middle class' in China
☐ Technological cooperation with China's institutions
☐ Labour cost reduction by relocating to interior provinces
☐ Closer coordination with customers and suppliers in Pearl River Delta region
☐ Make use of Hong Kong's headquarters' closeness to China
☐ Others

6. How does your company's senior management view the company's future business prospect?

☐ Confident ☐ Cautiously confident ☐ No strong position ☐ Expects turbulence ☐ Defensive

7. Which quality and process management system(s) are being practiced by your company (can choose more than one type)?

- ☐ ISO 9001:2008
- ☐ In-house TQM programme
- ☐ Six Sigma
- ☐ Selective quality improvement practices
- ☐ ISO 14001
- ☐ Industry quality system standards such as IECQ
- ☐ Quality control/inspection
- ☐ Other standards

8. How many years does your company has practiced quality management and improvement practices?

☐ 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16-20 years ☐ Over 20 years

Thank You for Your Valuable Time and Participation.