

*Volume 10 Number 2*

*Fall 2014*

**ISSN: 1553-5495**



# **Journal of Global Business and Technology**

## **SELECTED CONTENTS**

### **TECHNOLOGY MANAGEMENT AND THE LINK WITH TECHNOLOGY STRATEGY AND COMPANY PERFORMANCE**

*Theuns G. Pelser and J. J. Prinsloo*

### **THE RELATION BETWEEN QUALITY MANAGEMENT AND INNOVATION PERFORMANCE IN THE TEXTILE SECTOR IN PORTUGAL**

*Vitor Hugo dos Santos Ferreira and Rita Cardoso*

### **THE SUCCESS FACTORS OF CRM SYSTEMS: AN EXPLANATORY ANALYSIS**

*Houda Khlif and Rim Jallouli*

### **THE RISE OF THE RENMINBI FROM CONVERTIBLE TOWARD RESERVE CURRENCY STATUS AS A RESULT OF THE CHINA-US TRADE RELATIONSHIP**

*Robert G. Vambery*

### **THE MARKETABILITY DISCOUNT AND ITS IMPACT ON INITIAL PUBLIC OFFERING UNDERPRICING AND PRICE ADJUSTMENT**

*Juan M. Dempere, Ramon Griffin and Paul Camp*

*In Cooperation with the Global Business and Technology Association*



# **Journal of Global Business and Technology**

*Volume 10, Number 2, Fall 2014*

# ***The Journal of Global Business and Technology***

Volume 10, Number 2, Fall 2014



Publication Details  
Two issues per volume  
ISSN: 1553-5495

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## Website

Further information, including subscription details, are available on the Global Business and Technology Association website at: [www.gbata.org](http://www.gbata.org)

*The Journal of Global Business and Technology*, in cooperation with the Global Business and Technology Association and sponsored by the ADA University School of Business, has been listed with [1] Cabell's Directory, [2] EBSCO's Academic Search, and [3] ProQuest's ABI Form.

# TABLE OF CONTENTS

Nejdet Delener	Editorial	.....	iii
Nejdet Delener Chiang-nan Chao	Note from Editors	.....	viii
	Editorial Board and Reviewers	.....	ix
Theuns G. Pelser J. J. Prinsloo	TECHNOLOGY MANAGEMENT AND THE LINK WITH TECHNOLOGY STRATEGY AND COMPANY PERFORMANCE	.....	1
<p><i>Abstract: The role of the top manager in technology intensive industries has become much more multidimensional and multi-disciplinary. A critical concern of this discipline is optimizing returns to the company's stakeholders over the long term. This means sustaining performance by balancing strategic investments in technology with short-term profitability. The purpose of this study was to investigate technology management principles in widespread use in technology intensive industries and to explore their relationship to company performance. A non-probability, judgment sample of companies listed on the Johannesburg Stock Exchange (JSE) were taken. The study makes a contribution to the field of strategic management research by integrating the dimensions of several previous studies, to derive a more comprehensive taxonomy of technology management archetypes. Two distinct technology management factors obtained with the analysis were proved to positively influence the company performance dimensions and were classified as R&amp;D Commitment and Control Market Planning factors. The results show that strategic management choices can significantly affect company performance. It thereby indicates which of the underlying dimensions have the strongest relationship with company performance.</i></p>			
Vitor Hugo dos Santos Ferreira Rita Cardoso	THE RELATION BETWEEN QUALITY MANAGEMENT AND INNOVATION PERFORMANCE IN THE TEXTILE SECTOR IN PORTUGAL	.....	13

*Abstract: This study first reviews concepts and practices linked with Quality Management, Innovation and Performance. Then we investigate the relation between the three concepts aforementioned in the context of the textile sector in Portugal, through a questionnaire, based on different assessment levels. The study and the respective data analysis was based on the responses obtained from a total of 66 questionnaires, sent to ATP certified Portuguese companies in the textile sector. The results reveal that there is a direct relationship between Quality Management and Innovation and Innovation and Performance. However, regarding Quality Management and Performance, rather than a direct relationship, there seems to exist an indirect relationship. Thus, in this study, Innovation appears as a mediator between Quality Management and Performance. Therefore, an organization should have a set of good practices in terms of Quality Management, and whenever possible, promote Innovation as the differentiating factor in order to increase competitiveness.*

# TABLE OF CONTENTS

Houda Khlif Rim Jallouli	THE SUCCESS FACTORS OF CRM SYSTEMS: AN EXPLANATORY ANALYSIS .....	25
<p><i>Abstract: This research aims to examine the main factors leading to a successful customer relationship management system, more often referred to as CRM. Literature review of Roh, Ahn, and Han (2005), and the DeLone and McLean (1992, 2003) researches led to the development of a conceptual model studying the determinants of successful CRM. This research integrates both human and technological factors to explain the CRM system success. The hypotheses are tested on a sample of 265 users of CRM systems in internalized contact centers belonging to Tunisian companies. The results emphasize on the importance of customer orientation dimensions in addition to technological ones as the determinants of the CRM system success. Indeed, the customer orientation influences the CRM system quality. The total effect of “the customer orientation impact” and “the technological performances of the CRM system” enhances the quality of the company services and therefore the customer satisfaction and increases its profitability.</i></p>		
Robert G. Vambery	THE RISE OF THE RENMINBI FROM CONVERTIBLE TOWARD RESERVE CURRENCY STATUS AS A RESULT OF THE CHINA-US TRADE RELATIONSHIP .....	43
<p><i>Abstract: An increasing portion of China’s international trade moved away from being denominated in US Dollars to being denominated in Chinese Renminbi. This is in part the result of China’s many years of trade surpluses with the US which enabled the PRC to build a\$4 trillion financial hoarding of hard currency assets.</i></p> <p><i>Though further reforms to its internal financial system need to be made before the Renminbi will be held in significant quantities by central banks, the acceptance of the Renminbi by a number of China’s trading partners as a unit of account in trade reduces dependence on the Dollar in international trade.</i></p> <p><i>This paper examines some of the measures pursued by the PRC that enabled its currency to progress from inconvertibility to convertibility and now toward reserve currency status. It also examines some of the reasons for the relative decline in the Dollar’s dominance. The paper concludes with findings on what both economic powerhouses should do to enhance their respective positions as they compete against each other in international trade.</i></p>		
Juan M. Dempere Ramon Griffin Paul Camp	THE MARKETABILITY DISCOUNT AND ITS IMPACT ON INITIAL PUBLIC OFFERING UNDERPRICING AND PRICE ADJUSTMENT .....	60
<p><i>Abstract: The main goal of this article is to provide statistical evidence about the impact of the marketability discount on Initial Public Offering (IPO) underpricing and price adjustment. Our results suggest that the marketability discount has a positive and significant relationship with the level of IPO underpricing and the price adjustment. Similarly, our results suggest that the period of time between the IPO date and the last pre-IPO transaction date is negatively related with both the level of IPO underpricing and the price adjustment. We also find evidence that the marketability discount declines with the number of pre-IPO transactions and changes over time.</i></p>		
	Manuscript Guidelines .....	76
	<b>JGBAT</b> Subscription Forms .....	79

## **EDITORIAL**

Management of technology links engineering, science, marketing, operations, human resources and other management disciplines to formulate strategy, develop technological capabilities and apply them to achieve strategic objectives. There is a critical need to understand the key factors that lead to innovation excellence, the organizational and environmental innovation, and the importance of innovation strategies. The main purpose of the first study by Theuns Pelser and Hein Prinsloo was to investigate technology management principles in widespread use in technology intensive industries and to explore their relationship to company performance. The problem addressed in Pelser and Prinsloo study, was the need for a better understanding of the role that technology management play in determining company performance. The study focused on two central questions:

- [1] What is the prevalent technology management dimensions being employed by South African companies in technology intensive industries?
- [2] What relationships can be observed between the technology management dimensions and company performance?

A survey of R&D managers of companies listed on the Johannesburg Stock Exchange (JSE) was conducted through the use of a questionnaire. The South African context was chosen both from an operational purpose and the objective to compare the findings with those obtained from studies conducted in other countries or regions. Since the performance of companies in technology intensive industries could be more affected by technology policies than by the performance of companies in other industries, it was assumed that companies in technology industries would be more likely to have technology strategies, thereby making it easier to observe the relationships of interest. R&D managers from 200 South African technology intensive companies were asked to complete a self-administered electronic questionnaire designed to gather data regarding their company's technology policies.

A non-probability, judgment sample of companies listed on the Johannesburg Stock Exchange (JSE) was taken. It was decided to use listed companies on the JSE for two primary reasons: [1] Listed companies display a capacity and capability (capital and human resources) for R&D activities compared to smaller unlisted companies. [2] Quantifiable data (e.g. annual reports) is more readily available for the external stakeholders of listed companies than it is on unlisted companies. Two hundred companies or divisions were identified and incorporated in the survey after the screening stage. Feedback was received from 89 R&D managers of these two hundred companies, stating their willingness to participate in the survey. A total of 84 completed responses were received and captured for the study. This translates to a 42% response rate from the base of 200 originally identified companies.

The results of Pelser and Prinsloo study show that the role of the top manager in technology intensive industries has become much more multidimensional and multi-disciplinary. This is recognized by assigning both the R&D Commitment and Control Market Planning factors to the top manager and top management team functions. These two functions are responsible for the formal technology policy within the company, with the objective to manage technical risk, increasing the sophistication of technology components utilized and the number of technologies in which the company maintains competence.

The R&D Commitment factor reflects the aggressiveness of a company's R&D commitment and the emphasis it places on integrating R&D operations. It mirrors the organizational issues and the processes involved in developing and implementing a strategic approach to technology. Companies, who have loaded heavily on this factor, emphasize acquiring information about emerging technological threats, opportunities and sources. The majority of the respondents have indicated, that the principal form of R&D applied for technology acquisition and assimilation, are their own laboratories. This conforms to similar findings, which suggest a growing centralization of R&D among leading high-technology companies. Furthermore, these companies place a significant emphasis on formal product plans that are market-driven and formal technology plans that are product-driven.

The Control Market Planning factor indicates the degree of researcher empowerment, researcher rewards, the integration of R&D with the business units and the level of R&D investment. It, therefore, signifies the propensity of a company to integrate R&D operations into product division operations and to manage R&D personnel based on R&D project success. Companies that have loaded high on this factor are displaying characteristics of a typical IMO. Furthermore, these companies commit high levels of investment to their R&D activities relative to sales and place emphasis on achieving financial leverage for R&D investments through external funding. These investments determine the technical outputs of a company, such as patents and new product and process technologies. Finally, Pelser and Prinsloo research indicates that technology policy plays a key role in the formulation and implementation of business strategies. It is thus recommended that companies use technology proactively as a competitive weapon and a key-positioning factor.

Any organization must know how to control their product and service life cycle to ensure that in the end the organization will achieve the desired quality. Quality management should be a part of a subsystem of the overall management system and included in development strategies. The study by Vitor Hugo dos Santos Ferreira and Rita Cardoso first reviews concepts and practices linked with Quality Management, Innovation and Performance. Then it investigates the relation between the three concepts aforementioned in the context of the textile sector in Portugal, through a questionnaire, based on different assessment levels.

The study and the respective data analysis were based on the responses obtained from a total of 66 questionnaires, sent to ATP certified Portuguese companies in the textile sector. The results reveal that there is a direct relationship between Quality Management and Innovation and Innovation and Performance. However, regarding Quality Management and Performance, rather than a direct relationship, there seems to exist an indirect relationship. Thus, quality Management is a contributing factor for Innovation that will enable better organizational performance. The performance of new products depends largely on the company's ability to make good use of market information to understand what consumers want and, subsequently, their ability to implement the right strategies to achieve these expectations and in that sense, a good quality management becomes an essential tool in this process. Hence, Quality Management is not primarily a factor of direct impact on performance, but rather something that contributes to the introduction of new products, and especially processes that improve performance. It can also be argued that TQM works to improve the performance in the long term, because it allows textile companies become more innovative.

With this study, Ferreira and Cardoso conclude that Portuguese companies (in the textile sector) must have a good Quality Management capacity, but should also focus on innovation as a differentiating factor, which mediates the relationship between Quality and Organizational Performance. New products and processes seem to be essential to an improved performance (measured qualitatively).

Enterprises can increase their chances of success by developing a customer-focused approach for all of their activities. Customer Relationship Management (CRM) seems to be the solution for the survival and the development of the company. An appropriate use of CRM data can be an important source of competitive advantage. The CRM is a combination of business strategy and technology. CRM systems are implemented to support the business strategy of customer-oriented systems. The research by Houda Khelif and Rim Jallouli proposes a conceptual model studying the factors contributing to the success of a CRM system.

The study of CRM stands at the intersection of two different disciplines: marketing and Information Systems. Therefore, Khelif and Jallouli study integrates both human and technological factors to explain the CRM system success. The human factor is measured by the customer orientation of the personal in contact and the technological factor is mainly related to the system quality. The customer satisfaction and the profitability are considered as the measures of the CRM intrinsic and extrinsic success.

The main proposed hypotheses test the impact of the quality of the CRM systems on the profitability via the customer satisfaction. The contribution of this research lies in the empirical validation of the model with 265 users of CRM systems in internalized contact centers belonging to Tunisian companies. Analyzes

have identified two decisive factors: “Customer orientation” and “Quality of the system”. The customer orientation has a direct positive effect on the quality of the system. All dimensions of “Customer orientation” have a significant and positive effect on the profitability. Indeed, interacting and serving the customer is inherent to the employee’s pleasure. This research confirms the existence of an optimum level of salesperson customer orientation with regard to the sales performance. The employee feels comfortable and at ease when responding to customer requests. This ease will be felt by the customer, and an environment of mutual understanding is established between staff and their contacts. When employees are motivated and able to listen to customers and serve better their requests, the customer satisfaction and the customer loyalty are improved.

Since it is so important that employees are willing to help customers and are pleased to serve them, the support from the top management and the allocation of adequate resources for the adoption of the CRM system are decisive, because this encourages employees to use the tool in their daily work and results in an efficient customer relationship system which impacts significantly the profitability of the company. “The quality of the system” confirms a three dimensional structure: the quality of the system, the quality of client information and the convenience of the system. The first dimension relates to the characteristics of the output of the system (quick response and immediate results, reliable and complete). The second measures the usefulness and the integration of the client information. The system convenience relates to the ease of use. This research demonstrates that the efficiency and the convenience of the system have an influence on the profitability through “customer satisfaction”. An effective system is one that provides accurate, reliable, complete and immediate results. These performances and quality characteristics encourage users to provide better services. Customers are then satisfied and profitability improves. The empirical results of Khlif and Jallouli study confirm that “Customer orientation” influences “CRM system quality”. The total effect of “customer orientation” and “system quality” influences “customer satisfaction” and “profitability”. Customer orientation and CRM system quality are therefore the levers of successful CRM systems.

As a conclusion, a successful implementation and use of CRM solutions enable companies to gain productivity and efficiency, optimize the contact management and retain customer. Managers should strengthen the quality of CRM systems, increase the level of customer’s orientation to serve and satisfy their clients. The high level of both technical competencies and managerial commitment to the system are then crucial.

Ever since nations have been issuing money, money’s three key functions have been well known: [1] unit of value, [2] medium of exchange and [3] store of value. The principal applications of these three tasks were and still are taking place within the country that created and named a particular currency. Within the jurisdiction of that government it could be declared a legal tender to be accepted in payment for all obligations, commercial or financial. Once a currency came to be used in transactions across national borders, its acceptability and desirability came to be described as [1] inconvertible, [2] convertible or [3] reserve currency. The classical reference to the term *convertible currency* implied the ability to exchange paper currency into gold or silver *bullion* or coins. Since nearly all national currencies became inconvertible even before the US closed the gold window in 1971, the term *inconvertibility* came to be used to describe the inability to convert currency of a nation into the currencies of many other nations or the unacceptability of the inconvertible currency in payment for imported goods and services.

Though *inconvertibility* may be associated with the lack of reliability of a government and its economy, it can be the result of a central government’s desire to exercise control and to direct the economic activities of its peoples, of various branches of government, and of corporations, whether privately or government owned. Moreover, the *inconvertibility* may have been created by force of law that made it illegal to take currency out of or bring units of that currency into the country. Such arrangements, enforced by punitive governmental powers enable the State to largely isolate itself from international events that include not just military conflicts but also fluctuations in business cycles, financial crises and external debt defaults. Beyond these, the choice of *inconvertibility* helps [1] to prevent the flow of funds out of the country, [2] to force foreign suppliers and investors to convert their currencies into the host country’s currency and [3] to maintain domestic financial stability by curtailing inflation.



In the People's Republic of China (PRC) this third goal of curtailing inflation through strict monetary and fiscal policies and currency controls manifested itself in the *near freezing of wages and prices* over decades (1950-1980) during which many other countries experienced economy distorting and even run-away inflation. It also curtailed demand for goods and services, thereby making it easier for the central government to use resources for infrastructure projects, the creation and maintenance of military forces and above all to preventing challenges to the power structure.

During the next quarter century (1980-2005) the PRC gradually became a major participant in international trade and in hosting foreign investments. The above referred to lack of wage and price changes gave the PRC enormous competitive advantages as, by purchasing power parity criteria, wages, product prices and the costs of many of China's assets were extremely attractive to foreign customers and to potential investors in China's production and distribution systems.

Recognizing that comparatively underpriced Chinese assets may significantly advantage foreign investors, the Chinese government severely restricted foreigners' abilities and rights to buy property or to make investments in production systems that eventually may yield substantial net incomes and capital gains to foreigners. Most cleverly, even to the extent that the PRC government did permit foreigners to participate in its economy through direct ownership, this privilege was and is subjected to near extortionary demands for concessions such as [1] joint venture requirements with directly or indirectly government controlled partners, [2] importation at foreign company expense of costly and leading-edge-capability production equipment, [3] the sharing and turnover of technologies, production methods and management skills that were among the sources of the foreign companies' global competitiveness and which could then be rapidly copied and even enhanced by Chinese corporations; these measures then enabled Chinese corporations to compete against the foreign joint venture corporations in the PRC's internal markets and soon after in international markets as well, [4] sever restrictions on the repatriation of profits even after all tax and fee payment obligations were met.

While *inconvertibility* had its uses for the government and economy of the PRC for many years, the large scale involvement of China in international business made it desirable to make the Renminbi more and more acceptable to trading partners as a unit of value and a medium of exchange. Progress toward this goal was made to a significant extent in the twenty first century, with nearly a third of China's international transactions becoming designated in Renminbi and with financial establishments in much of the world willing to accept Renminbi for conversion into other national currencies, albeit in limited quantities.

In environments in which China wants to be a strategic competitor against the US and other major economies with reserve currency status, China weakens those economies by reducing or denying to them some of the benefits they derive from their powerful and privileged financial statuses. The competitors' loss is China's gain. Declines in the positions of the competitors cause China's positions to rise. In a world of friendly countries it would be desirable for all currencies to be convertible and for reserve currencies not to be needed or for them to play only minor roles in global finance. In the real world of cut throat competition and belligerence, reaching and maintaining reserve currency status become main instruments of economic warfare. The fourth paper by Robert G. Vambéry discusses the impacts of the China-US business relationship's role in facilitating and accelerating the Renminbi's rise toward becoming a reserve currency. Through a comparative review of how governments approached the challenges of stagnation and of the global financial crisis, the author concludes that neither for fiscal policies nor for monetary policies are United States practices and experiences good guides for China to follow. Therefore, for the time being, China should not look to the United States for guidance for political-economic strategies and tactics to pursue.

The main goal of the fifth study by Juan M. Dempere, Ramon Griffin, and Paul Camp is to provide statistical evidence about the impact of the marketability discount on Initial Public Offering (IPO) underpricing and price adjustment. The marketability of an asset refers to the chances that said asset will be converted into cash without significant transaction costs. The marketability discount is the downward correction to the value of that asset to reflect the difficulty of converting it into cash. The marketability discount on the price of an asset will be equivalent to the transaction costs of converting that asset into cash. If the asset cannot be converted into cash quickly, investors will have to bear an opportunity cost for a period of time. The longer the period of time, the higher the opportunity cost, and the greater the marketability discount required for selling the asset.

Several factors may explain the marketability discount. An asset would be more or less marketable depending on how difficult it is to be valued. Similarly, the more uncertain the value of an asset, the higher its lack of marketability, and the greater the marketability discount required to convert it into cash. Several methodologies have been applied to study the marketability discount. One of them involves comparing the price of an asset during a period when the asset is marketable versus a period when the asset is not marketable. In the particular case of IPOs, pre-IPO studies involve the comparison of the price of a firm's stock share while it was still private versus the final IPO price. This is the methodology the authors apply in their research work; and measure the impact of the marketability discount on IPO underpricing and price adjustment.

Dempere, Griffin and Camp find statistical evidence that the level of IPO underpricing is positively related with the marketability discount, which supports their hypothesis that the marketability discount is a proxy measure of the level of difficulty to appraise a company's value. The authors also find statistical evidence that [1] the period of time between the IPO date and the last pre-IPO transaction date is negatively related to the level of underpricing. In other words, the impact of the marketability discount on the level of under-price declines when the period of time between the IPO and the pre-IPO transaction date increases; [2] the higher the marketability discount, the greater the uncertainty about the value of the firm, and the larger the price adjustment due to that vast vagueness associated with the market value of the firm; and [3] the influence of the marketability discount in the level of price adjustment is higher/lower when the last pre-IPO transactions takes place right/long after the IPO date; and [4] the marketability discount declines with the number of pre-IPO transactions and changes over time.

**Nejdet Delener Ph.D.**  
**Editor-in-Chief**

# NOTE FROM THE EDITORS

As an interdisciplinary indexed journal, *The Journal of Global Business and Technology (JGBAT)* serves academicians and practitioners in the fields of global business and technology management and their related areas. The *JGBAT* is also an appropriate outlet for manuscripts designed to be of interest, concern, and applied value to its audience of professionals and scholars.

Readers will note that our attempt to bridge the gap between theory and practice has been successful. We cannot thank our reviewers enough for having been so professional and effective in reiterating to contributors the need to provide managerial applications of their research. As is now obvious, the majority of the articles include a section on managerial implications of research. We wish to reiterate once again our sincere thanks to *JGBAT* reviewers for having induced contributors to answer the “so what?” question that every *Journal of Global Business and Technology* article is required to address.

Thank you for your interest in the journal and we are looking forward to receiving your submissions. For submissions guidelines and requirements, please refer to the Manuscript Guidelines at the end of this publication.

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# TECHNOLOGY MANAGEMENT AND THE LINK WITH TECHNOLOGY STRATEGY AND COMPANY PERFORMANCE

*Theuns G. Pelser and J. J. Prinsloo*

## ABSTRACT

*The role of the top manager in technology intensive industries has become much more multidimensional and multi-disciplinary. A critical concern of this discipline is optimising returns to the company's stakeholders over the long term. This means sustaining performance by balancing strategic investments in technology with short-term profitability. The purpose of this study was to investigate technology management principles in widespread use in technology intensive industries and to explore their relationship to company performance. A non-probability, judgment sample of companies listed on the Johannesburg Stock Exchange (JSE) were taken. The study makes a contribution to the field of strategic management research by integrating the dimensions of several previous studies, to derive a more comprehensive taxonomy of technology management archetypes. Two distinct technology management factors obtained with the analysis were proved to positively influence the company performance dimensions and were classified as R&D Commitment and Control Market Planning factors. The results show that strategic management choices can significantly affect company performance. It thereby indicates which of the underlying dimensions have the strongest relationship with company performance.*

Keywords: Technology Management; Company Performance; Control Market Planning; Process Management; R&D Commitment.

## INTRODUCTION

Pelser (2001) argues that technology plays an essential role in interactions among the individual, society and nature. Technological advances have major effects on each of these entities and are, in turn, influenced by them. Management of technology involves developing an understanding of these relationships and dealing with them in a rational and effective manner. The widely acknowledged importance of technology will grow; increasing the emphasis top managers must place on their companies' ability to compete through

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technology (Nambisan & Wilemon, 2003).

The 2011-12 R&D survey, conducted by the Human Sciences Research Council (HSRC, 2014), shows that South Africa's performance remains far below the government's initial target of spending 1% of GDP on R&D by 2008. South Africa had spent R22.2bn on R&D in 2011-12, or 0.76% of GDP. This was precisely the same ratio reported for 2010-11, and is noticeably down on previous surveys: it was 0.87% in 2009-10, 0.92% in 2008-09 and 0.93% in 2007-08. These findings emulate the global trends of slowing growth in R&D investment in many parts of the world as a result of the recent global financial crisis. Unfortunately for South Africa, it also trails far behind the international average of 1.77%, and lags most of the other members of BRICS (an association of five major emerging national economies: Brazil, Russia, India, China and South Africa).

The progressiveness of technology management, however, goes beyond basic research and development (R&D) expenditures. Increasingly, corporate strategists are focusing on the integration of technology throughout the organisation as a source of sustainable competitive advantage (Song, Zhao & Di Benedetto, 2013). This particular study builds on the previous works of Pelser (2014a, 2014b, 2014c, 2014d, 2014e) regarding strategy taxonomies and their link to company performance.

## LITERATURE REVIEW

According to Thongpapanl (2012), the management of technology links engineering, science, marketing, operations, human resources and other management disciplines to formulate strategy, develop technological capabilities and apply them to achieve strategic objectives. This study follows the usage of Clark, Ford & Saren (1989), who use the term to refer to the organisational issues and the processes involved in developing and implementing a strategic approach to technology. Technology management thus relates to the process aspects of technology policy (Harmon, & Davenport, 2007).

The strategic approach has evolved from the control paradigm, which argues for an integration of technology with corporate strategy (Pelser, 2001). Technology has been seen as an essential component of the strategy and forms part of the strategic thinking and planning process (Pelser, 2014a). Companies will concentrate on constantly refining their abilities to acquire and deploy relevant technologies, which will be treated as an integral part of their corporate strategies. The technology leaders will be faced with technology acquisitions and deployments. Hence, sustainable competitive advantage will be realised only from the company's ability to become skilled at the technology acquisition and deployment tactics (Pelser, 2014a, 2014b, 2014c, 2014d).

### Technology Performance Measurement

Hansen (2010, p. 17) remarks, that in many manufacturing companies' managers do not have adequate measures for evaluating company performance or for comparing overall performance from one subsidiary to the next. The author goes further by stating that the traditional cost-accounting figures can be used, but that these figures do not represent the true nature of company performance. What Hansen (2010) found even more disturbing, is that private sector accounting systems, as traditional management information systems, which are supposed to represent the organisational reality, are problematic themselves.

Zahra & Hayton (2008) established that the literature on performance is very extensive, but that it shows a lack of consensus as to the meaning of the term. Brush & Vanderwerf (1992) further point out, that the use of the term "performance" by researchers, includes many constructs measuring alternative aspects of performance. This is consistent with the finding of Murphy *et al.*, (1996) who, after a comprehensive literature review, were able to isolate a total of 71 different measures of performance.

## Technology Management Dimensions

This study follows the usage of Clark *et al.*, (1989, p. 215), who used the term *management of technology* (MOT) to refer to the organisational issues and the processes involved in developing and implementing a strategic approach to technology. Technology management is measured through the use of the following six process or technology management dimensions (Pelser, 2001):

1. *Technology awareness refers to a company's scanning processes, specifically the emphasis it places on acquiring information about emerging technological threats, opportunities and sources (Clark et al., 1989; Dvir et al., 1993). It is measured in terms of the emphasis placed on staying informed about emerging technologies or competing technologies and the awareness of different technology sources.*
2. *Technology acquisition refers to the methods by which companies acquire technology internally or externally (Maidique & Patch, 1988; Clark et al., 1989). It is measured in terms of the emphasis a company places on acquiring technology from internal R&D activities and from external research institutes or other companies.*
3. *Technology and product planning refers to the formal planning processes that companies utilise to select and manage R&D programs (Maidique & Patch, 1988). According to Lee, Yoon, Lee, & Park (2009) technology planning involves the reformulation of technical terms and objectives into business terms and objectives. It is measured in terms of the emphasis a company places on formal product plans that are market-driven and formal technology plans that are product-driven.*
4. *R&D organisation and management refers to the degree to which R&D activities are linked to other business operations and the methods companies employ to organise, empower and encourage R&D personnel (Eng & Ozdemir, 2014; Maidique & Patch, 1988). It is measured in terms of the emphasis a company places on integrating R&D operations into product division operations and managing R&D personnel based on R&D project success (Van Aduard de Macedo-Soares, Mayrink & Cavalieri, 2009).*
5. *R&D investment refers to the methods by which companies fund R&D activities (Tsai, Hsieh & Hultink, 2011) and the emphasis placed on achieving a specified return on investment (Clark et al., 1989; Yüce & Zelaya, 2014). It is measured in terms of the level of investment the company commits to R&D activities relative to sales and the emphasis placed on achieving financial leverage for R&D investments through external funding.*
6. *Manufacturing and process technology refer to the degree to which new technology is incorporated into the company's manufacturing plants and processes (Zahra & Covin, 1993). The appropriate manufacturing technologies can provide the company with considerable operational and competitive benefits (Sohal, 1995). It is measured in terms of the emphasis a company places on the use of technology to achieve low manufacturing costs or to manufacture unique products and to improve production flexibility or reduce lead-times.*

## Company Performance

Zahra & Hayton (2008) recognized that the literature on performance is very wide, but that it shows a lack of agreement as to the meaning of the term. Brush & Vanderwerf (1992) indicate that the use of the term "performance" by researchers includes many constructs measuring alternative aspects of performance. This is consistent with the findings of Murphy, Trailer and Hill (1996) who, after a comprehensive literature review, were able to isolate a total of 71 diverse measures of performance.

Despite the fact that financial performance is obviously important for the company, it draws only on the economic dimension of performance, neglecting other important goals of the company (Venkatramen & Ramanjan, 1986). This argument is supported by Zahra & Covin (1994), who argues that research that considers only a single performance dimension or a narrow range of performance constructs (e.g. multiple indicators of



profitability), may result in misleading descriptive and normative theory building. According to the author of this study, it is unlikely that any single performance measure or dimension could serve the needs of a diverse set of research questions. This view is also shared by Zahra & Hayton (2008), who points out, that a multi-dimensional construct provides an alternative in establishing valid operational definitions. Further to this, Murphy *et al.* (1996) argue, that a distinction between performance measures should be done on the grounds of whether the sources are secondary data (also known as archival) versus primary data (e.g. questionnaire interview).

## **PROBLEM STATEMENT AND RESEARCH QUESTIONS**

There is a critical need to understand the key factors that lead to innovation excellence, the organisational and environmental innovation, and the importance of innovation strategies (Pelser, 2014a, 2014b, 2014c, 2014d). The main purpose of this study is to investigate technology management principles in widespread use in technology intensive industries and to explore their relationship to company performance. The problem addressed in the study, is the need for a better understanding of the role that technology management play in determining company performance. The study focuses on two central questions:

1. What is the prevalent technology management dimensions being employed by South African companies in technology intensive industries?
2. What relationships can be observed between the technology management dimensions and company performance?

## **RESEARCH METHODOLOGY**

The data gathering and analysis phase of the study adheres to the same methodology as applied by Pelsner (2014a, 2014b, 2014c, 2014d) regarding strategy taxonomies and their link to company performance and had the following three objectives:

1. Gathering data along key technology management dimensions from R&D managers of technology intensive companies.
2. Gathering objective data about the performance (input & output) of those companies selected for the study.
3. Analysing the data using multivariate statistical methods to explore the relationships among the technology management dimensions and company performance.

## **Data Requirements**

The number of dimensions historically used to develop strategy taxonomies and the variables required to describe them, have varied by researcher (Pelser, 2001). When Miller & Friesen (1977) derived their strategy taxonomies in 1977, they gathered data on 31 variables representing four categories of adaptive behaviour (later classified as strategy dimensions). Galbraith & Schendel (1983) gathered data on 26 variables using the PIMS database. Snow & Hrebiniak (1980) used a 145 item questionnaire to gather data that were subsequently reduced to ten distinctive competence variables and one performance ratio prior to analysis. Cool & Schendel (1987) developed 15 scope and resource commitment dimension variables based on data drawn from a large variety of databases. Fiegenbaum & Thomas (1990) used seven scope and resource deployment dimensions and six performance variables that reduced to three performance ratios. Zahra & Covin (1993) used four dimensions to develop five business strategy archetypes and three dimensions to represent technology strategy. Dvir, Segev & Shenhar (1993) used Miles & Snow's (1978) four strategy archetypes and two strategy variables.

Several of the seminal studies on strategic taxonomies gathered research data in the form of management perceptions of their company's objectives or capabilities relative to some benchmark, e.g. the competition's objectives or capabilities (Hong, Hang & Jackson, 2011 and Pelser, 2001). This is consistent with the method recommended by Galbraith & Schendel (1983) and Panagiotou (2007), and is the method employed in the present study. This method also lends itself to answers that can be provided on a normalised five point Likert Scale, with "three" valued answers being "neutral" or "at the industry norm".

A survey of R&D managers of companies listed on the Johannesburg Stock Exchange (JSE) was conducted through the use of a questionnaire. The South African context was chosen both from an operational purpose and the objective to compare the findings with those obtained from studies conducted in other countries or regions. Since the performance of companies in technology intensive industries could be more affected by technology policies than by the performance of companies in other industries, it was assumed that companies in technology industries would be more likely to have technology strategies, thereby making it easier to observe the relationships of interest. R&D managers from 200 South African technology intensive companies were asked to complete a self-administered electronic questionnaire designed to gather data regarding their company's technology policies. The questionnaire requested data on the specific industry in which the company operates, the technology and innovation strategy of the company and the processes the company employs to develop and implement the strategy. Eighty-four valid responses were ultimately received and used in the study.

## **Sample Selection**

A non-probability, judgment sample of companies listed on the Johannesburg Stock Exchange (JSE) was taken. It was decided to use listed companies on the JSE for two primary reasons: (1) Listed companies display a capacity and capability (capital and human resources) for R&D activities compared to smaller unlisted companies. (2) Quantifiable data (e.g. annual reports) is more readily available for the external stakeholders of listed companies than it is on unlisted companies. Two hundred companies or divisions were identified and incorporated in the survey after the screening stage. Feedback was received from 89 R&D managers of these two hundred companies, stating their willingness to participate in the survey. A total of 84 completed responses were received and captured for the study. This translates to a 42% response rate from the base of 200 originally identified companies.

# **ANALYSIS OF RESULTS**

## **Factor Analysis: Technology Management**

Twelve technology management variables (A11, A12 and A21 – A30), were factor-analysed by using the principal axis factoring method. Then using the latent root criterion, three factors were extracted on the basis of their Eigenvalues being greater than 1. Together they accounted for 78.81% of the variation in the data. The factors were rotated by using the Varimax rotation method. The correlation matrix for the twelve management variables was reviewed to confirm the existence of a substantial number of correlations, which indicates the existence of common factors. The technology management variables had correlations greater than .26 and more than 60% of the matrix elements were greater than .50. Bartlett's test of sphericity confirmed, that the correlation matrix was not an identity matrix. The Kaiser-Meyer-Olsen (KMO) measure as sampling adequacy was .756, which Hair *et al.*, (1998) characterised as "middling". This is also defined as an adequate measure, indicating that the degree of correlation between the unique factors was low.

The Chi-square statistic was 922.647 with 66 degrees of freedom, which is significant at the .000 level. The reduced set of variables collectively meets the necessary threshold of sampling adequacy and thus the

fundamental requirements for factor analysis. The reproduced correlation matrix contained 12 residual values (18%) greater than .05, indicating that the model fits the data. The rotated technology management factor loadings are contained in Table 1. As a reminder, each respondent was asked to report on the importance of each of the variables to his or her company relative to major competitors. The heaviest factor loading for each variable is formatted in bold font style.

**Table 1: Rotated Technology Management Factor Matrix**

<i>Variable</i>	<i>Variable Description</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>
<b>A22</b>	Awareness of technologies	<b>.954</b>	.165	.054
<b>A21</b>	Awareness of technology sources	<b>.904</b>	.225	-.018
<b>A25</b>	Using formal product plans	<b>.758</b>	.466	.092
<b>A24</b>	External technology acquisition	<b>.729</b>	.319	-.042
<b>A23</b>	Internal technology acquisition	<b>.727</b>	.366	.103
<b>A26</b>	Using formal technology plans	<b>.657</b>	.389	-.101
<b>A27</b>	Integrating R&D operations	.350	<b>.821</b>	.069
<b>A29</b>	High level of R&D investment	.329	<b>.732</b>	.121
<b>A30</b>	External funding for R&D	.160	<b>.674</b>	-.193
<b>A28</b>	Evaluating & rewarding R&D personnel	.370	<b>.662</b>	-.039
<b>A11</b>	Technology and manufacturing	-.004	-.133	<b>.950</b>
<b>A12</b>	Technology and production flexibility	.036	.075	<b>.856</b>

All of the primary factor loadings used in the factor interpretation exceeded .50 in value. According to Hair *et al.* (2010), factor loadings greater than  $\pm .30$  are considered to meet the minimal level; loadings of  $\pm .40$  are considered important; and if the loadings are  $\pm .50$  or greater, they are considered more important.

1. R&D Commitment – The Eigenvalue of the first factor was 5.729. The technology awareness variables (A21-A22), technology acquisition variables (A23-A24) and the technology and product planning variables (A25-A26) loaded heavily on this factor. Taken together, these patterns of factor loadings clearly reflect the aggressiveness of a company's R&D commitment.
2. Control Market Planning – The Eigenvalue of the second factor was 2.889. The R&D organisation and management variables (A27-A28) and R&D investment variables (A29-A30) loaded heavily on this factor, indicating the degree of researcher empowerment, researcher rewards and integration of R&D with the business units.
3. Process Management – The Eigenvalue of the third factor was 1.806. The manufacturing and process technology variables (A11-A12) both loaded heavily on this factor. This indicates that the underlying factor relates to the company's manufacturing and technology processes.

## Factor Analysis: Company Performance

The methodology for factor analysing the dependent variables, was similar to that used for the previous sections. Six company performance variables (B31 – B36) were factor-analysed by using the principal axis factoring method. Then, using the latent root criterion, two factors were extracted on the basis of their Eigenvalues being greater than 1. Together they accounted for 75.80% of the variation in the data. The factors were rotated by using Varimax rotation method.

Based on the Kaiser criterion of selecting factors with Eigenvalues greater than 1, the number of factors to be extracted, were set at two. However, the scree test indicates, that three factors would be retained. In combining these two criteria, two factors were eventually retained for further analysis, because of the very low Eigenvalue (.538) for the third factor. The Chi-square statistic was 235.832 with 15 degrees of freedom, which is significant at the .000 level. The reduced set of variables collectively meets the necessary threshold of sampling adequacy and thus the fundamental requirements for factor analysis.

The final statistics showed, that 75.80% of the variance was explained by the two factors. The reproduced correlation matrix contained 3 residual values (20%) greater than .05, indicating that the model fits the data. The rotated company performance factor loadings are contained in Table 2. The heaviest factor loading for each variable is formatted in bold font style.

**Table 2: Rotated Company Performance Factor Matrix**

<i>Variable</i>	<i>Variable Description</i>	<i>Factor 1</i>	<i>Factor 2</i>
<b>B32</b>	Efficiency of innovation project management	<b>.841</b>	.308
<b>B33</b>	Impact of the innovations	<b>.797</b>	.213
<b>B31</b>	New product contribution to sales	<b>.773</b>	.188
<b>B34</b>	R&D expenditure	<b>.756</b>	.123
<b>B35</b>	Patents registered	.089	<b>.762</b>
<b>B36</b>	Return on assets	.308	<b>.619</b>

All of the primary factor loadings used in the factor interpretation, exceeded .50 in value. Considering the factor loadings, the rotated factors are interpreted below:

1. Input Performance – The conceptual definition for this factor is the extent to which the R&D manager or other top manager perceives the innovation management organisation has achieved its desired objectives over the last three years. The Eigenvalue of the first factor was 3.167. The four input variables (B31 – B34) loaded heavily on this factor. Taken together, this pattern of factor loadings clearly reflects the effectiveness of the innovation management organisation (IMO).
2. Output Performance – This factor represents the performance of the company where (1) patent information was used to measure R&D activities and (2) return on assets (ROA) was used to measure company financial performance. The Eigenvalue of the second factor was 1.381. The patent's registered variable (B35) and the return on assets variable (B36) loaded heavily on this factor, indicating the degree of fit for this performance measure.

## Reliability and Validity

The consistency of the survey data was assessed by using Cronbach's coefficient alpha, which measure the consistency of the entire scale. The Cronbach alpha computations for the five extracted factors are shown in Table 3. For the R&D commitment it is .9367; for the control market planning it is .8601; for the process management it is .8826, and for the input performance it is .8887. These high values indicate a high degree of data stability.

The factor analysis found relatively high degrees of communality among the variables. Most of the dimension variables have communalities greater than 0.5. The clear patterns of the factor loadings on the variables further validated the content and process constructs.

**Table 3: Reliability Analysis**

<i>Variable</i>	<i>Scale mean if item deleted</i>	<i>Scale variance if item deleted</i>	<i>Corrected item total correlation</i>	<i>Alpha if item deleted</i>	<i>Alpha</i>
R&D Commitment (R&D)					
A21	17.6667	29.9598	.8716	.9177	.9367
A22	17.5595	30.1289	.8882	.9161	
A23	18.2500	30.4307	.7744	.9298	
A24	18.3095	29.3247	.7845	.9296	
A25	17.7857	31.3993	.8470	.9221	
A26	17.9286	30.5972	.7368	.9349	
Control Market Planning (CMP)					
A27	9.9048	10.0390	.7991	.7864	.8601
A28	10.2262	9.6952	.6981	.8264	
A29	10.1310	9.4646	.7346	.8102	
A30	10.3810	11.2266	.6083	.8593	
Process Management (PM)					
A11	3.0476	1.2266	.8108	-	.8826
A12	3.2857	1.9415	.8108	-	
Input Performance (InP)					
B31	6.9405	13.3820	.7446	.8617	.8887
B32	7.1429	13.0637	.8234	.8305	
B33	7.6548	13.1685	.7540	.8584	
B34	7.8333	15.1044	.7130	.8741	
Output Performance (OutP)					
B35	21.2381	151.9185	.5015	-	.4104
B36	2.4524	11.6724	.5015	-	

## Multiple Regression Analysis

To ascertain the relative importance of the factors in explaining the variation in the dependent variables, multiple regression analysis was used to analyse the relationship between the dependent variables and independent variables. The Pearson r-correlations were calculated to find the strength and direction of the relationships between the factors and the performance dimensions.

By using p-values, it was possible to distinguish between the levels of significance. From Table 4 the null-hypothesis was rejected ( $p < 0.05$  or  $p < 0.01$ ) for all the factor correlations except for the Process Management factor ( $p > 0.05$  or  $p > 0.01$ ).

It is apparent that both the R&D Commitment and Control Market Planning factors have a significant positive effect on Input and Output Performance.

The level of relationship ( $R^2$  or  $Rsq$ ) that can be detected reliably with the proposed regression analysis was calculated to indicate the percentage of total variation of the Input Performance factor (InP). The Control Market Planning ( $Rsq = 0.5344$ ) factor explains 53% of the total variation of the Input Performance factor. It means that the degree of researcher empowerment, researcher rewards, the integration of R&D with the business units and the level of R&D investment, determine the variation of the company's contribution to sales, efficiency of innovation project management, impact of the innovations, and R&D expenditure. The R&D Commitment factor ( $Rsq = 0.3352$ ) explains 34% of the total variation of the Input Performance factor. It means that the aggressiveness of a company's R&D investment and the emphasis it places on integrating R&D operations, determine the variation of the company's contribution to sales, efficiency of innovation project management, impact of the innovations and R&D expenditure. The Process Management ( $Rsq = 0.0380$ ) factor explains 4% of the total variation of the Input Performance factor. It means, that the emphasis a company places

on manufacturing flexibility and technology processes, determines the variation of the company's contribution to sales, efficiency of innovation project management, impact of the innovations, and R&D expenditure.

**Table 4: Correlation Matrix**

		<b>R&amp;D Commitment</b>	<b>Control Market Planning</b>	<b>Process Management</b>	<b>Input Performance</b>	<b>Output Performance</b>
<b>R&amp;D Commitment</b>	Pearson	1.000	.638*	.012	.579*	.710*
	Correlation					
	Sig. (2-tailed)	.	.000	.917	.000	.000
	N	84	84	84	84	84
<b>Control Market Planning</b>	Pearson	.638*	1.000	-.039	.731*	.382*
	Correlation					
	Sig. (2-tailed)	.000	.	.721	.000	.000
	N	84	84	84	84	84
<b>Process Management</b>	Pearson	.012	-.039	1.000	-.195	-.030
	Correlation					
	Sig. (2-tailed)	.917	.721	.	.075	.788
	N	84	84	84	84	84
<b>Input Performance</b>	Pearson	.579*	.731*	-.195	1.000	.435*
	Correlation					
	Sig. (2-tailed)	.000	.000	.075	.	.000
	N	84	84	84	84	84
<b>Output Performance</b>	Pearson	.710*	.382*	-.030	.435*	1.000
	Correlation					
	Sig. (2-tailed)	.000	.000	.788	.000	.
	N	84	84	84	84	84

\* Correlation is significant at the 0.01 level (2-tailed).

The level of relationship ( $R^2$  or  $Rsq$ ) that can be detected reliably with the proposed regression analysis was calculated for the creation of the Output Performance model. The Control Market Planning ( $Rsq = 0.1459$ ) factor explains 15% of the total variation of the Output Performance factor. It means that the degree of researcher empowerment, researcher rewards, the integration of R&D with the business units, and the level of R&D investment, determine the variation of the company's contribution to R&D activities (patents registered) and the company's efficiency in using its assets (return on assets). The R&D Commitment ( $Rsq = 0.5041$ ) factor explains 50% of the total variation of the Output Performance factor. It means, that the aggressiveness of a company's R&D investment and the emphasis it places on integrating R&D operations, determine the variation of the company's contribution to R&D activities (patents registered) and the company's efficiency in using its assets (return on assets). The Process Management ( $Rsq = 0.0900$ ) factor explains only 0.1% of the total variation of the Output Performance factor. It means, that the emphasis a company places on manufacturing flexibility and technology processes, have relatively no impact on the variation of the company's contribution to R&D activities (patents registered), and the company's efficiency in using its assets (return on assets).

## MANAGERIAL IMPLICATIONS

The role of the top manager in technology intensive industries has become much more multidimensional and multi-disciplinary. This is recognized by assigning both the R&D Commitment and Control Market Planning factors to the top manager and top management team functions. These two functions are responsible for the formal technology policy within the company, with the objective to manage technical risk, increasing the sophistication of technology components utilised and the number of technologies in which the company maintains competence. Furthermore, they should be conscientious with encouraging researcher empowerment, the vast integration of R&D with the company's business units and a high level of R&D

investment.

The R&D Commitment factor reflects the aggressiveness of a company's R&D commitment and the emphasis it places on integrating R&D operations. It mirrors the organisational issues and the processes involved in developing and implementing a strategic approach to technology. Companies, who have loaded heavily on this factor, emphasise acquiring information about emerging technological threats, opportunities and sources. Furthermore, these companies express the need for acquiring technology from internal R&D activities and/or external sources. The majority of the respondents have indicated, that the principal form of R&D applied for technology acquisition and assimilation, are their own laboratories. This conforms to similar findings, which suggest a growing centralisation of R&D among leading high-technology companies. Furthermore, these companies place a significant emphasis on formal product plans that are market-driven and formal technology plans that are product-driven.

The Control Market Planning factor indicates the degree of researcher empowerment, researcher rewards, the integration of R&D with the business units and the level of R&D investment. It, therefore, signifies the propensity of a company to integrate R&D operations into product division operations and to manage R&D personnel based on R&D project success (Garnett & Pelsner, 2007). The innovation management organisation (IMO) is responsible for developing new products and technologies in response to future threats and opportunities. Hence, science and technology from the external environment are combined with the company's in-house skills, knowledge and competencies to develop new products and technologies. Companies that have loaded high on this factor are displaying characteristics of a typical IMO. Furthermore, these companies commit high levels of investment to their R&D activities relative to sales and place emphasis on achieving financial leverage for R&D investments through external funding. These investments determine the technical outputs of a company, such as patents and new product and process technologies.

Another requirement of the innovation management organisation (IMO) is frequent new product introductions and frequent product upgrades, with the emphasis placed on expanding existing product lines and by introducing improved versions of existing products. The activities associated with this Product Development Intensity factor, are contained within the R&D, production and sales & marketing functions; the latter function being primarily responsible for interfacing between the company and the marketplace for introducing new or upgraded products.

The domain of innovation management includes both the R&D and strategic management functions. R&D consists of those activities and responsibilities ranging from understanding progressive technology to generating ideas to developing new products and technologies as underpinned by the R&D Commitment factor. Thus the collaboration between the R&D Commitment factor with the strategic management function activate the innovation process by identifying new and/or different combinations of market technology factors which will create the competitive advantage necessary for sustaining industry leadership.

Finally, this research indicates that technology policy plays a key role in the formulation and implementation of business strategies. It is thus recommended that companies use technology proactively as a competitive weapon and a key-positioning factor.

## CONCLUSION

The rationale of this study was to investigate technology management in widespread use in technology intensive industries and to explore their relationship to company performance. The following two research questions were addressed in this study.

1. What is the prevalent technology management dimensions being employed by South African companies in technology intensive industries?
2. What relationships can be observed between the technology management dimensions and company performance?

Question one was addressed through factor analysing the technology management dimensions obtained from the survey. The second question was answered by regression analysis. The two distinct technology management factors obtained with the analysis were proved to positively influence the company performance dimensions and were classified as R&D Commitment and Control Market Planning factors.

Strategic management is inter alia a process of managing a company's relationship with the environment. As a matter of strategy, a product should be matched with that segment of the market in which it is in all probability most likely to succeed (Prinsloo, Groenewald & Pelser, 2014, p. 130). According to De Wet Fourie (2008, p. 34) managers can add value to organisational effectiveness and growth through the identification of new opportunities and the development of new markets in a global arena. A critical concern of this discipline is optimizing returns to the company's stakeholders over the long term. This means sustaining performance by balancing strategic investments in technology with short-term profitability.

The present study makes a significant contribution to the field of strategic management research by integrating the dimensions of several previous studies, to derive a more comprehensive taxonomy of technology management archetypes. It also derives a broader set of dimensions for use in strategic management research. The results show that technology management choices can significantly affect company performance. It thereby indicates which of the underlying dimensions have the strongest relationship with company performance.

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# THE RELATION BETWEEN QUALITY MANAGEMENT AND INNOVATION PERFORMANCE IN THE TEXTILE SECTOR IN PORTUGAL

*Vitor Hugo dos Santos Ferreira and Rita Cardoso*

## ABSTRACT

*This study first reviews concepts and practices linked with Quality Management, Innovation and Performance. Then we investigate the relation between the three concepts aforementioned in the context of the textile sector in Portugal, through a questionnaire, based on different assessment levels. The study and the respective data analysis was based on the responses obtained from a total of 66 questionnaires, sent to ATP certified Portuguese companies in the textile sector. The results reveal that there is a direct relationship between Quality Management and Innovation and Innovation and Performance. However, regarding Quality Management and Performance, rather than a direct relationship, there seems to exist an indirect relationship. Thus, in this study, Innovation appears as a mediator between Quality Management and Performance. Therefore, an organization should have a set of good practices in terms of Quality Management, and whenever possible, promote Innovation as the differentiating factor in order to increase competitiveness.*

*Keywords:* Quality Management, Performance, Innovation, Companies in the Textile Sector

## INTRODUCTION

Quality Management, Innovation and Performance have been thoroughly studied, nevertheless there are not many studies that address all these three issues jointly. Our research tries to follow this novel path, allowing attempting to relate these concepts in order to facilitate a deeper understanding of this complex relation between all these variables.

The drive for quality is an ongoing challenge for managers and how they organize the activities of the company, so they can meet their real intentions and expectations of their customers. Quality management is an important option for organizations achieve gain competitive advantages over their competitors.

Based on the concepts of Quality management, innovation and performance it was our purpose to realize the extent to which these factors are connected and how they influence the turnover of Portuguese textile sector companies. The textile sector, specifically the clothing industry is undergoing a period of restructuring and conversion that lead to the elimination of thousands of jobs. With the end trade barriers for Chinese companies, strong competitive pressure created by economies of cheap labor, required several changes. Portugal

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to a new competitive capacity and flexibility both with respect to products and the production processes and management structures.

The main objectives of this research are to verify:

- What is the relationship between Quality Management, Innovation and Performance?
- What is the relationship between these two dimensions (Quality and Performance) and the level of innovation?
- Are There mediating variables in this relation?

## QUALITY MANAGEMENT AND INNOVATION

### TQM

In 1956, Armand Feingenbaum introduced the concept of Total Quality Control (TQC) that was defined as an effective system for integrating the efforts of developing, maintaining and improving quality to allow the marketing, engineering, production and service reach complete customer satisfaction (Santos, 2010).. His work was the starting point for the Standards of Quality Assurance System, which later, in the 1980s , led to the international standards ISO 9000 ( International Organization for Standardization , 1987 ) based in Geneva (Santos, 2010). This concept was the also the foundation of Total Quality Management (TQM) and Quality Management fields.

Nevertheless, there is not a clear definition of TQM. According to Miller, W. (1996), TQM, is a progressive process through which management takes all necessary steps to allow any member of the organization in carrying out its activities, it is responsible for compliance with standards and to meet or exceed the needs of its internal and external customers. According Zehir C. *et al.* (2012), the TQM is a holistic approach to quality improvement for businesses in order to improve performance in terms of quality and also innovation.

The benefits of using TQM in management are different and quite important. These practices can lead to improved operational efficiency, optimized resources, reduced costs and increased employee motivation. While being on one of the tools with greater impact on turnover, TQM is also one of the most difficult tools to implement effectively. Its main philosophy is that organizations acquire strengths by satisfying the needs of their customers (Zehir *et al.* 2012). TQM is an option to redirect the management of organizations. According to Longo *et al.* (1996), it values the human being within organizations, recognizing their ability to solve problems on the spot when they occur, and implements an enduring search of perfection.

It uses a variety of analytical techniques and management tools, such as the Six Sigma methodology to analyze processes, performance and supply chain logistics. Thus, the general principles of Total Quality are:

- Customer Focus,
- Quality first,
- Improvement of products and processes,
- Involvement, commitment and human resource development.

## Innovation

The importance of innovation has been growing in scientific literature and in the rising concern of policy makers, with several research centres and projects being created over the last two decades, especially in Europe and Asia (Fagerberg, 2004). However, innovation in the context of socio-economic development is not something new, in fact, as Fagerberg (2003) states, innovation is as old as humanity even if the study of innovation as a phenomenon per se did not exist until very recently. Although Schumpeter (1934) referred to innovation as something central to the process of economic development, as something that drives growth cycles, the truth is that only in the 1960s did studies of innovation begin to emerge as an independent field (Fagerberg and Verspagen, 2002; Hurmelinna et. al., 2013).

The Frascati Manual (dedicated to the measurement of R&D activities with its first version published in the 1960s) (OECD, 1995) and the Oslo Manual (dedicated to the measurement and interpretation of innovation - published for the first time in 1992 and re-published in 1997 and 2005) (OECD, 2005) provide some answers for the definition of innovation. Both manuals distinguish between innovation activities and innovation itself. Innovation refers to products (goods or services) and processes new or significantly improved that are introduced to the market (the "new" parameter indicates that they at least have to be new to your business although the concept is usually expanded geographically to mean new to the region, to the country or to the world). Innovation activities, in addition to R&D, include the acquisition and installation of machinery for production (tooling-up) and industrial engineering, pre-fabrication and the beginning of manufacturing processes, marketing new products, the acquisition of technology in the form of patents, licenses, or in the form of technology embodied in machinery and equipment and design (which represents an essential part of the innovation process). Design would include the plans and drawings aimed at defining procedures, technical and operational aspects necessary for the conceptualization, development, manufacture and marketing of new/improved products and processes.

## TQM and Innovation

With the rise of the use of the concepts of Quality and Innovation, there have been more studies that seek to verify the relationship between Quality and Innovation. Prajogo and Sohal (2001), after an extensive review of the literature, concluded that the relationship between TQM and innovation is equally complex and ambiguous.

Some scholars argue that there is a positive link between total quality and innovation, while others emphasize that there is a negative relationship. According Zehir *et al.*, (2012), the main reason for the inconsistent findings that exist in the literature, is related to the multidimensional nature of both the quality of both the Innovation. The arguments in favor of a positive relationship between the Total Management and Innovation in Quality are that customer orientation, leadership, continuous improvement and also speed to market that are important quality drivers that are also significant to the success of innovation (Flynn, 1994).

The theoretical arguments about the relationship between TQM and Innovation can be made at two levels of analysis: First, considering that quality and specifically TQM, creates an environment conducive to Innovation and Development, and secondly, showing that many of the determinants of innovation are affected by some dimensions of TQM.

Market orientation, one of TQM principles, allows strategic alignment between market and technology, allowing new responses to consumer demands (Erdil and Erdil, 2006). Thus, the practices of TQM associated with this guiding principle promote learning and innovation in business processes, allowing the promotion of innovative ideas to market, or by promoting the need for novelty (Erdil and Erdil, 2006).. Know-how enables innovation because it improves practices in business and makes it possible to formulate more pertinent questions about the need for change and call for creativity. Thus, continuous improvement associated with its practices, helps to promote critical thinking about the companies know-how and thus induce innovation.

Teamwork, can also have positive effects on innovation, fostering communication and information flows, which are needed in the formulation of Innovation projects. Moreover, TQM practices argue that a greater capacity of the workforce allows greater degrees of autonomy and hence greater capacity for innovation.

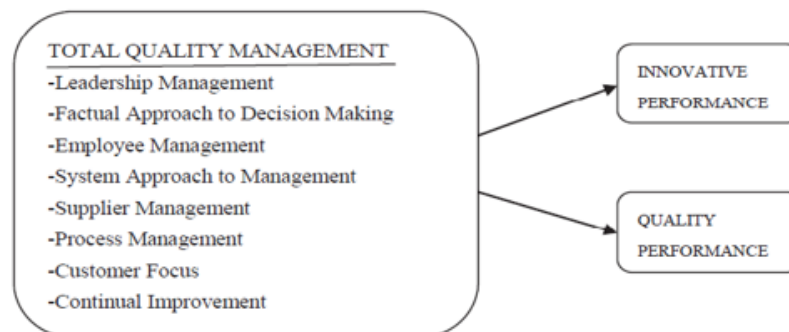
However, there are also arguments that reject the existence of a positive relationship between TQM and innovation. These can be summarized in two aspects: Firstly, it may be assumed that quality and innovation arise from alternative competing priorities and consequently its management, achievement and performance are conflicting and often can substitute each other, rather than complementary. Secondly, it is assumed that a strict market orientation could have negative effects on innovation and performance (companies that only answer to present needs fail to innovate to the future). Also, centering only on the client/consumer, catering to his needs and their individual characteristics and the anxiety of having to control all processes can be reflected in the loss of autonomy of workers and delaying the development of the innovation itself. Some scholars argue that the negative relationship between TQM and innovation stems from the fact due to the implementation of respective standards creativity can be hindered (Zehir et. al., 2012).

However, it is known that the promotion of innovation is considered to be a cornerstone of business competitiveness (Daft and Becker, 1978). From the standpoint of intangible resources that positively affect innovation, most are promoted by TQM, taking into account the inherent features of human resources, organizational, business and knowledge management resources as a source of innovative ideas. Thus, innovation is positively affected if the company undertakes a TQM program.

Studies conducted by (Perdomo - Ortiz, J. et al, 2009), indicate that there is a relationship between the practices of TQM and Innovation, and the principle of continuous improvement enhances the essential elements of an innovation-driven organization and the practices associated with human resource management help to promote information and knowledge flows, that lead to innovation. According to this perspective it was found that teamwork, preparation of all people to the issues of quality, the existence of a system of incentives for a job well done and selecting people according to characteristics of each job mean lead to innovation best practices as well to a greater focus on quality according to the requirements of customers. However, among all dimensions of TQM that are related to innovation, there are three of them stand out among the various studies cited above: Process management; Product development; Human resource management.

Companies that are based on the principles of continuous improvement and consumer orientation, and utilize team work, are more prone to develop the innovation. Quality practices in business are a precursor to the accumulation of innovation capability and hence innovative practices and their routines are associated with the know-how resulting from Quality Management (Figure 1).

**Figure 1. TQM an Innovation**



Source: Perdomo–Ortiz *et al.* (2009)

In addition, the study conducted by Zehir, C. *et al.*, (2012) indicates that there is a positive relationship between the leadership process management, continuous improvement and customer focus and Innovative Performance. Again, according to this perspective, it seems that there is a positive relationship between TQM and Innovation.

## Performance, Innovation and TQM

It is generally accepted that companies with a greater propensity for innovation usually have better performance, because they have more conditions to be successful in responding to the environment, and develop new capabilities that lead to competitive advantage and consequently the high performers to other competitors. He and Nie (2008) state that innovation is the most important variable in determining the performance of companies. Without innovation, companies run the risk of simply losing their competitiveness because they knew not respond to what the market dynamics constantly imposes. According to Milan (1997), the impact of the Innovation on performance is not always clear in the short term, therefore long-term impacts, such as economic and social benefits associated with innovation do not arise before innovation diffusion. In general, the studies that have been done show that firms with a culture of innovation have higher profits and have a faster growth than other companies.

Several authors conclude that the implementation of a Quality system makes the company to adopt a set of tools, which ultimately have a key role in the success TQM implementation and in performance (Boiral and Roy, 2007). A study by Kassinis and Soteriou (2003) show that there is a positive relationship between the adoption of quality management practices and performance, the level of services, and that these gains have repercussions on cost reduction, economy of resources, opportunity for innovation, customer retention and loyalty and motivation of employees. Studies show that high performing firms apply high quality related activities more often than the less successful firms (Lindman, *et. al*, 2012). Quality Management received a high degree of attention in the literature because several studies indicate that greater performance is related with this system of Quality Management (Nair, 2006).

## EMPIRICAL ANALYSIS

The research model presented reflects the analysis of the influence of TQM on Innovation and the influence of TQM/ innovation on organizational performance.

We seek to study this on the Portuguese textile sector. Currently the textile industry as a whole generates a turnover of 6,267 million Euro business (3.5% of European value) with about 7,000 companies laboring in all subsectors of the textile and clothing industry although most of these are small and medium enterprises. The Importance of Industry Textiles & Clothing in the Portuguese Economy:

- 10% - Total of Portuguese exports;
- 19% - Jobs in Manufacturing Industry;
- 8% - Turnover of Manufacturing Industry
- 8% - Production Manufacturing Industry.

## Sample and data collection procedure

We test our hypotheses by conducting a survey in the context of a single sector. The analysis of a single sector may be appropriate for evaluating innovation performance, since some of the knowledge base and practices involved in innovation processes are likely to be homogeneous (Santarelli and Piergiovanni, 1996). Choosing one sector to focus our data collection we decrease the range of unimportant variations that might influence the constructs of interest but at same time we recognize that this sampling method may limit our conclusions.

The data was collected in 2013 through an online questionnaire. This method is preferable to the physical collection of data in terms of speed and cost (Wright, 2005) and also allows respondents to spend less time in completing the questionnaire (although it doesn't allow the control of the respondents). Taking into consideration that the vast majority of companies in the sector aim of this study lie mainly in the north of the country, it would be more complicated to travel to all the respective target companies. Three pre-tests were made before the completion of the questionnaire with companies belonging to the region of Leiria textile sector. Before the beginning of our empirical study, ie before sending questionnaires by email, we previously contacted the President of the ATP (Association of Textile Portugal), which provided the list of their associates and we were formally authorized to send the questionnaires. Our sample consists of 66 valid responses (from universe of 500 companies). Due to the size and characteristics of the sample (a non-probabilistic convenience sample) the findings of this study cannot be generalized.

## **MEASUREMENT OF VARIABLES**

### **TQM**

This study selected the TQM scale used by Lai, K. (2003). This scale was developed from the scale resulting from the research conducted by Black and Porter (1996), whose purpose, according to the authors, was to empirically validate the model of self-evaluation of the Total Quality Management system used for Malcolm Baldrige award. Specifically, 39 items grouped into 10 dimensions or critical factors, which concluded to be reliable and valid (Santos, J. 2010) were identified. In our study, we simplified the scale for 8 dimensions (People management and customers (4 items), Communication and improving information (4), management interface with the outside (3), Strategic Quality Management (7), Organizational Structure for improvement (2) Operating Plan Quality (3), Evaluation systems of quality improvement (4), Culture for the quality (2)).

### **Innovation**

Following Perdomo-Ortiz., et. al. (2009) and Gupta (2012) we used 9 items to measure innovation (Continuous improvement of service products, Replacement of old products by new and innovative, Development of green products, Investing in services and innovative solutions, Measures to improve and change, Creativity, Funding for innovation, Clear strategies for innovation, Active involvement of employees in innovation strategies).

### **Performance**

There are different methods to measure Organizational Performance, from essentially financial models, to more subjective models taking into account the different stakeholders. Sharma et. al., (1997) report that as major performance measures we should have several dimensions or indicators of financial nature but also indicators of non- financial nature. These are more qualitative in nature and ensure that strategic objectives and other prospects for stability and continuity of the business should be a concern when defining a system of benchmarking.

To measure organizational performance, we followed Allred, *et al.* (2011), adopting a model that assesses the performance of organizations in view of a wide number of items, measured through qualitative answers (Industry Leadership, Income from sales, Turnover, Profit margins, Growth in sales volume, Profit growth of sales, Growth in market share, Getting new customers, Increase sales to existing customers)

## Control Variables

The size and business level were the control variables considered in this study. Firm size was measured by number of employees and business level was defined by turnover. It is argued that larger firms who may have access to scarce resources (Narver and Slater, 1990), may be more likely to develop innovations than smaller companies (Kyrgidou and Spyropoulou 2012).

## Validity

According to the validity test results, we had a good level of reliability and internal consistency, demonstrating the existence of a good correlation between homogeneity and validity in the questionnaire. There is a good correlation between questions and answers, verifying that there is good internal consistency for all scales used. After the reliability and validity scales have been determined, there was the validity of the dimensions, using a method of reducing the size of the data. In all scales was retained an element assessed by Cronbach's alpha, and analyzing percentage of variance it appears that all the retained components explain more than 50 % of the total variance of the original variables. The results of the principal component factor analysis showed that all items had a significant loading on the corresponding factor ( $> 0.50$ ) and the proportion of variance explained by each factor is significant (Table 1). Accordingly, we chose to keep all the items of the scale and it appears that there is a strong relationship between each item and the new components.

## Structural Model

Subsequently we used a structural equation model, and used as latent variables the target variables of this study, i.e., Quality Management, Innovation and Performance, while the manifest variables were the questions in the questionnaire. We tested the following initial model:

After checking and adjusting of the respective model, it appears that this is a quality model that is statistically well-adjusted and with good results (CFI – 0.961 and TLI 0.951). Through analysis of the p\_value of the estimates of the Model Fit Output we found that there is a direct relationship between Quality Management and Innovation and Performance. However, it was found that there is a direct relationship between Quality Management and Performance.

Regarding the model with standardized variables we verify that there is a relationship between all variables. However, there is only a slight influence of Quality Management for Performance with the value  $\beta = 0.31$ , while the influence of Quality Management in Innovation is much higher than with  $\beta = 0.79$  (and statistically significant), and Innovation in Performance with  $\beta = 0.47$ . These results indicate that innovation has more direct influence on the performance of the Quality Management, and it ends up working as a mediating variable between Quality Management and Performance. However, only the relation between Innovation and Performance was statistically significant at 5%. The control variables turnover were not significant.

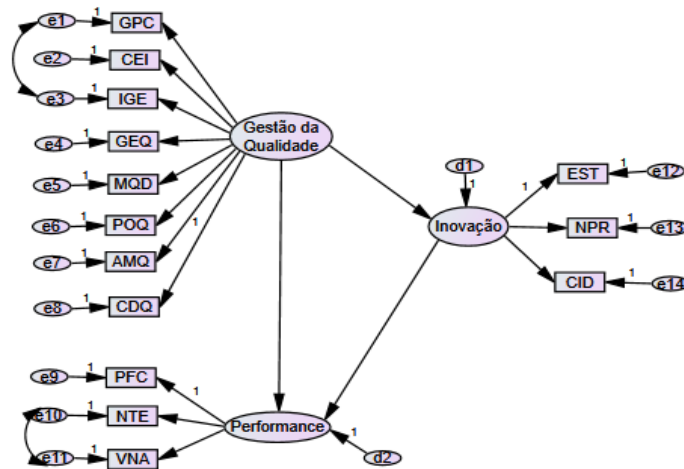


**Table 1. CATPCA analysis**

Componente	Alfa de Cronbach			Component Loadings	
		Valor próprio	% Variância	Item	Componente
A – Gestão de Pessoas e Clientes	0,921	2,592	86,406	1.1	0,944
				1.2	0,970
				1.3	0,872
B- Comunicação e melhoria de informação	0,862	2,351	78,364	2.1	0,942
				2.2	0,953
				2.3	0,746
C – Interface de Gestão com o exterior	0,925	2,608	86,945	3.1	0,986
				3.2	0,890
				3.3	0,916
D – Gestão Estratégica da Qualidade	0,901	3,580	71,609	4.1	0,813
				4.2	0,851
				4.3	0,834
				4.4	0,873
				4.5	0,859
E – Estrutura organizacional para a melhoria da qualidade entre departamentos	0,79	1,653	82,636	5.1	0,909
				5.2	0,909
F – Plano Operacional da Qualidade	0,981	2,890	96,319	6.1	0,989
				6.2	0,990
				6.3	0,965
G- Sistema de avaliação da melhoria da Qualidade	0,931	3,311	82,787	7.1	0,899
				7.2	0,945
				7.3	0,907
				7.4	0,888
H – Cultura para a Qualidade	0,784	1,645	82,234	8.1	0,907
				8.2	0,907
I – Performance – Capacidade de alcançar os objetivos da empresa.	0,927	5,692	63,247	9.3.1	0,670
				9.3.2	0,848
				9.3.3	0,829
				9.3.4	0,761
				9.3.5	0,863
				9.3.6	0,901
				9.3.7	0,792
				9.3.8	0,596
J – Inovação – Autoavaliação da empresa sobre o seu grau de inovação.	0,94	6,093	67,705	9.3.9	0,848
				10.1	0,773
				10.2	0,775
				10.3	0,756
				10.4	0,893
				10.5	0,871
				10.6	0,862
				10.7	0,772
				10.8	0,869
				10.9	0,841

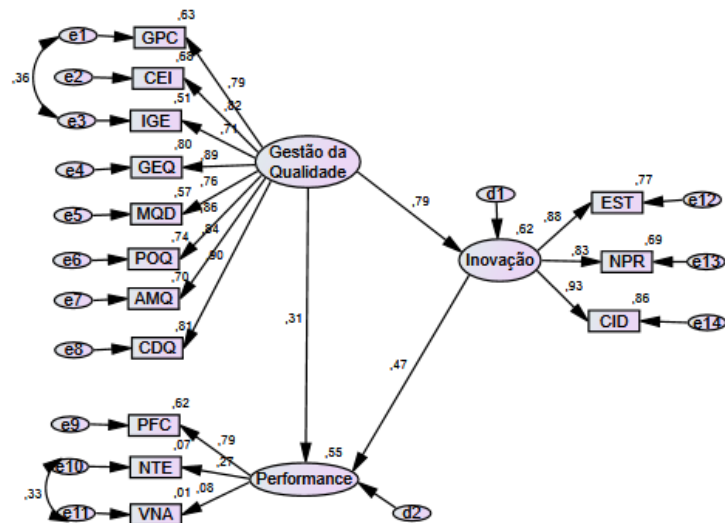
**Figure 2. Structural Model**

$X^2(df)=\backslash\text{cmin};p=\backslash p;X^2(df)=\backslash\text{cmin}\text{df}$   
 $CFI=\backslash\text{cfi};GFI=\backslash\text{gfi}$ ,  
 $RMSEA=\backslash\text{rmsea};P(\text{rmsea}<0.05)=\backslash\text{pclose}$



**Figure 3. Structural Model Fit and Estimates Output**

$X^2(72)=97,826;p=.023;X^2(df)=1,359$   
 $CFI=.961;GFI=.833$ ,  
 $RMSEA=.074;P(\text{rmsea}<0.05)=.153$



Later by using the Bootstrap test that aims to verify the indirect effects of a particular variable, it was also demonstrated that the innovation variable works as a mediator, mediating the relation between Quality Management and Performance. Thus, innovation has a direct impact on performance and mediates the relation between Quality Management and Performance.

**Figure 4 - Indirect Effects – Two Tailed Significance (PC)**

	Qualidade	Inovação	Performance
Inovação	...	...	...
Performance	<b>.025</b>	...	...
CID	,010	...	...
Novos_Produtos	,010	...	...
Estratégia	,010	...	...
PFC	,011	,026	...
@9.1Atualmentequalonúmerodetrabalhadoresnaempresa	,057	,064	...
@9.2QualovolumedenegóciosporanoemEuros	,656	,648	...
Gestaopessoaseclientes	...	...	...
Comunicacaoeinformacao	...	...	...
Interfacedegestãoexterior	...	...	...
Gestãoestrategicaqualidade	...	...	...
Qualidadedepartamentos	...	...	...
Planooperacionalqualidade	...	...	...
Avaliacaoqualidade	...	...	...
Culturaqualidade	...	...	...

## CONCLUSIONS

Any organization must know how to control their product and service life cycle to ensure that in the end the organization will achieve the desired quality. Quality management should be a part of a subsystem of the overall management system and included in development strategies. Nevertheless, Quality Management is not a magic wand that has the miraculous solution to all for all problems (Dantas and Coelho, 2007). According to Alegre et al. (2011) the fact of having an efficient quality management practice, by itself is not enough to achieve a better Organizational Performance. As we demonstrated in our study, Quality Management is a contributing factor for Innovation that will enable better organizational performance. The performance of new products depends largely on the company's ability to make good use of market information to understand what consumers want and, subsequently, their ability to implement the right strategies to achieve these expectations (Rodrigues, 2008) and in that sense, a good quality management becomes an essential tool in this process. In our study, Quality Management is not primarily a factor of direct impact on performance, but rather something that contributes to the introduction of new products, and especially processes that improve performance. It can also be argued that TQM works to improve the performance in the long term, because it allows textile companies become more innovative.

With this study, we conclude that Portuguese companies (in the textile sector) must have a good Quality Management capacity, but should also focus on innovation as a differentiating factor, which mediates the relationship between Quality and Organizational Performance. New products and processes seem to be essential to an improved performance (measured qualitatively).

Nevertheless, this study had a low response rate which may have influenced the obtained results. Moreover, the measurement of the essential constructs of this study was based on previous studies, hence changing the scales lead to alteration of the results achieved.

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# THE SUCCESS FACTORS OF CRM SYSTEMS: AN EXPLANATORY ANALYSIS

*Houda Khlif and Rim Jallouli*

## ABSTRACT

*This research aims to examine the main factors leading to a successful customer relationship management system, more often referred to as CRM. Literature review of Roh, Ahn, and Han (2005), and the DeLone and McLean (1992, 2003) researches led to the development of a conceptual model studying the determinants of successful CRM. This research integrates both human and technological factors to explain the CRM system success. The hypotheses are tested on a sample of 265 users of CRM systems in internalized contact centers belonging to Tunisian companies. The results emphasize on the importance of customer orientation dimensions in addition to technological ones as the determinants of the CRM system success. Indeed, the customer orientation influences the CRM system quality. The total effect of “the customer orientation impact” and “the technological performances of the CRM system” enhances the quality of the company services and therefore the customer satisfaction and increases its profitability.*

Keywords: CRM, system quality, contact centers, customer orientation, profitability, Tunisia

## INTRODUCTION

Nowadays, consumers are more aware, more mobile and more demanding. Capturing their interest is becoming difficult. It is, therefore, vital for companies to refocus their priorities around customers and maintain effective durable relationships with them. Furthermore, understanding customers' needs and providing value-added services are factors that determine the success or the failure of organizations (King and Burgess, 2008). By making its customers loyal, the company has the chance to increase its profitability and its performance. It also has a better chance to survive in a market characterized by stiff competition. In this regard, improving and maintaining the relationship with the customer increases his loyalty, customer retention and profitability (Ko, Kim, Kim and Woo, 2008). This relationship is a strategic line of progress. The customers are the main source of companies' revenues. They can increase their chances of success by developing a customer-focused approach for all of their activities. Following the emergence of relationship marketing and the development of information technology, CRM seems to be an ideal solution for the survival and development of the company. The use of CRM data can be a source of competitive advantage especially if there is an appropriate use of these

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data for knowledge management to inform decision maker and to control commercial and marketing process (Stein, Smith and Lancioni, 2013; Lindman and al, 2012).

According to Firth and Lawrence (2006), CRM which is *an innovation in information system* has become crucial for organizations. The authors argue that more than 50% of organizations could be in the process of implementing such a system. These organizations are looking more and more to implement and ensure the CRM success. Our research attempts to examine the following question: What is the impact of human and technological factors on the success of CRM systems? This research is essentially based on the "System Information success model" of DeLone and McLean (1992, 2003) and the Roh et al. (2005) one, with the aim to provide a framework for assessing CRM's success. This research integrates both human and technological factors to explain the CRM success in the particular context of internalized call centers. This helps companies operating in these centers to raise awareness of the importance of successful CRM projects and improve the systems in place. This research uses a hypothetical-deductive approach. The survey is based on questionnaires to collect data.

## **CRM: DEFINITIONS, TECHNOLOGIES AND BENEFITS**

CRM allows the company to refocus on its customers. This section presents definitions and CRM technologies as well as the benefits of managing customer relationships.

### **Definitions and technologies**

Several companies and managers have a blurred vision of CRM. It is difficult to find convergent definitions of CRM in the literature. CRM can be viewed as a process, a strategy or a technology (Lefebure and Venturi, 2001; Day and Van den Bulte, 2002; Teo and al, 2006). In order to be successful, CRM projects must be considered beyond the technological aspects. CRM is a complex term that includes several organizational aspects (Mendoza and al, 2007). Chen and Popovich (2003) consider CRM as a coherent and comprehensive set of people, processes and technologies that seeks to understand the customers. This is then an integrated approach that aims to maintain and develop the relationship with the company contacts. Lefebure and Venturi (2001) apprehend CRM as follows: *"The management of customer relations combines technologies and business strategies to provide customers with products and services that they expect. The management of customer relationships is the ability to identify, acquire and retain the best customers with the goal of increasing sales and profits."* (p. 4). Following a review of the literature on CRM, the last definition provided by Lefebure and Venturi (2001) concept is largely used. It stipulates that the CRM is a combination of business strategy and technology. CRM systems are therefore implemented to support the business strategy of customer-oriented systems. CRM systems are enterprise applications that manage and control the business interactions with customers through the integration of customer-oriented business processes including marketing, sales and customer services. (Gefen and Riding, 2002; Dong and Zhu, 2006). CRM is based on a number of technologies that ensure the application of its basic principles. According to Teo and al (2006), CRM architecture includes three segments namely: operational CRM, collaborative CRM and analytical CRM. Operational CRM deals with the daily management of a relationship with the client through the contact points (customer service, call center, sales force ...). On the other hand, collaborative CRM includes all the communication and interaction channels with customers and partners as well as work technology groups, such as workflow and e-mail. In addition, analytical CRM is the integration and processing of data, and their conversion into useful information for the analysis of customer relationships and project improvement (Chalmeta, 2006).

## **The benefits of CRM**

Richards and Jones (2008) identifies the most important advantages gained by an enterprise as a result of using CRM: Identification of the most profitable customers, improvement of the efficiency and the effectiveness of the sales force, customization of products and services, improvement of the efficiency and the effectiveness of customer service, and price improvement. Krasnikov, Jayachandran and Kumar (2009) clarify the impact of CRM implementation on cost and profit efficiencies. The authors explain the CRM implementation success by the dual value creation: The firm generates profits by creating value for its customers. In addition, the centralization of information in a single database will increase the visibility and the quality of the information available to all stakeholders of the company. The expected gains are financial through the value creation and the increased revenues generated by better sale productivity. Task automation allows saving time and streamlining (Richards and Jones, 2008).

## **THEORETICAL FRAMEWORK FOR EVALUATING THE SUCCESS OF INFORMATION SYSTEMS**

One of the major concerns of researchers in information systems (IS) is the evaluation of these systems and the construction of an appropriate measurement instruments to determine their success. We will present a literature review related to the model dealing with the assessment and the success of IS in general and CRM in particular. The successful model of DeLone and McLean (1992) asserts that success is a dynamic process. It is a multidimensional construct composed of six dimensions between which there is an interdependence both temporal and causal (Seddon, 1997). Given the popularity of this model and the wide variety of attempts of revisions and adaptations, and empirical validations, both authors provide new considerations in their model, leading to the success model of DeLone and McLean (2003). The authors add to the two main features of the system, the quality of the system and the quality of information, a third dimension which is the quality of service. Furthermore, they adapt their model to the context of electronic commerce. This IS success model is widely used by researchers; it is subject to several adaptations in different contexts. Chien and Tsaur (2007), and Bernroider (2008) adapt the model to assess the success of an ERP. Lee and al (2008) develop a model based on the DeLone and McLean (2003)'s one to evaluate the success of a free software model. Halawi and al (2007) use the model to evaluate the success of a knowledge management system (KMS). All these studies confirm the popularity and the success of the model. Regarding CRM, Roh and al (2005) propose a success model of IS where they emphasize existing relations between the prerequisites for CRM success (alignment process, the quality of customer information, system support), intrinsic success (efficiency, customer satisfaction) and extrinsic success of the system (profitability of the business). Therefore, the authors explore the factors affecting the successful implementation of CRM in the light of research in marketing as well as other ones dealing with IS.

## **CONCEPTUAL MODEL AND RESEARCH HYPOTHESES**

The proposed model seeks to identify the factors contributing to the success of CRM systems. The general structure of the model is largely based on the Roh and al (2005)'s research. This general structure of the model allows the analysis of the first level involving the determinants of the CRM success, the second level examining intrinsic success in terms of customer satisfaction, and the last level measuring extrinsic success by the dependent variable "the business profitability". The study of CRM stands at the intersection of two different disciplines: marketing and IS. Therefore, the conceptual model in this paper integrates variables that are derived from both marketing and IS literature.



## **Extrinsic Success: Profitability "PROF" (Conceptual Level 3)**

The success of a CRM should normally match the net profit, which is a complete and idealized measurement of the corresponding monetary amount for past and future benefits less the future and past expenditures allocated to the use of an application of information technology. Roh and al (2005) suggest that the success of CRM systems is based on the evidence that it could not be measured by net income. The authors use profitability as an alternative to net income. Profitability is defined as "the ability of a firm to secure a result expressed in monetary units" (Cibert, 1969). The profitability of a company is assessed by the ability of the company to maintain and pay the funds put at its disposal. Under the management of the customer relationship, improving satisfaction and customer loyalty becomes a powerful factor of profitability. Roh and al (2005) measure the profitability of the business by: the increase of the number of new customers, the increase of sales and revenues, the decrease of customer loss and the increase overall profitability.

## **Intrinsic success: Customer satisfaction "CS" (Conceptual Level 2)**

CRM creates value for the customer (Minami and Dawson, 2008). Ryals (2005) stipulates that CRM implementation facilitates the dissemination of customer knowledge throughout the organization departments and impacts positively the quality of the decision making process (Ryal, 2005; Mithas and al, 2005). It is essentially oriented towards customer satisfaction and customer retention, and these are main objectives of any CRM initiative. Some consider satisfaction as a comparison process or a part of it. Others consider it as the result of a process (consumer experience). Seen as a process, Tse and Wilton (1988) apprehend satisfaction as the consumer response to the evaluation of the perceived gap between previous expectations and the present performance of the product, as perceived after its consumption. Seen as the result of a process, customer satisfaction is the evaluation of the consumer shopping experience and an emotional response or the customer's feeling about his experience with the product or service (Oliver, 1992; Lin and Wang, 2006). The most significant definition is the one presented by Fornell (1992) which states that customer satisfaction is the collective result of customer perception, of the assessment and psychological reaction to the product or service consumption experience (Roh and al, 2005). The latter conceptualization of satisfaction is retained in this paper. Several researchers assume that satisfaction has an impact on customer's loyalty, which in turn affects profitability (Roberts-Lombard and Du Plessis, 2011; Sivadas and Baker-Prewitt, 2000; Rust and al, 1995; Storbacka and al, 1994; Schulze and al, 2012). Other researchers provide an empirical support for this relationship (Anderson, Fornell and Lehmann, 1994, Heskett et al., 1994 Hallowell, 1996). On the other hand, Nelson and al (1992) found that a better customer satisfaction results in a better performance: learning, net income and return on investment. Roh and al (2005) show that, in the context of CRM, customer satisfaction has a positive impact on profitability. Hence the following hypothesis:

*HP: Customer satisfaction (CS) has a direct positive impact on the profitability of the company (PROF).*

## **The Technological determinants of success: The system quality "SQ" (Conceptual Level 1T)**

The quality of the system is critical for any organization with an IS that expects to achieve a better return on investment. It must meet users' needs to better manage the technologies and the systems adopted. The assessment of the system quality by users is therefore necessary for its successful implementation. DeLone and McLean (1992) suggest that the quality of the system refers to the desired characteristics needed to produce the information: the performance characteristics of a system include: reliability, flexibility, being user-friendly and response time. Some researchers are aware of the quality of the system as a dimension of IS success (DeLone and McLean, 1992, 2003; Seddon, 1997) and an antecedent to the effectiveness of the system (Grover and al,

1996; DeLone and McLean, 2003). It has a positive impact on user satisfaction (DeLone and McLean, 1992, 2003; Seddon, 1997; Seddon and Kiew, 1994). Roh and al (2005) show that the support system has a positive impact on customer satisfaction with regards to the CRM. Satisfied users of the system are more comfortable and tend to show greater involvement in their work and thus perform their duties properly. This could be associated with a better customer satisfaction. A quality system improves working conditions, allows better management of activities and processes as well as an improved user satisfaction, meaning higher productivity

*HP2: The system quality (SQ) has a direct positive influence on customer satisfaction (CS)*

*HG2: The quality of the CRM system has a direct and indirect positive influence (via customer satisfaction) on profitability (PROF).*

## **The Human determinants of CRM success: *The customer orientation “CO”* (Level 1-H)**

Several studies (Kohli and Jaworski, 1990; Narver and Slater, 1990, 1994a) have investigated the effect of market orientation of the company on its performance. The association between market orientation and innovation steered the research related to the discordant results of the impact of market orientation on performance. Innovation is identified as the most important factor creating value in the relationship between market orientation and performance. Several empirical studies have confirmed the role of marketing orientation in the success of innovations (Henard and Szymanski, 2001; Gudmundsson, Boer and Corso, 2004; Liu and al, 2011).

Although Šebjan and al (2014) propose that the orientation of the organization in terms of process, technological and innovation impacts the results of the effective CRM use in organizations, Van Bentum and Stone (2005) argue that customer orientation is a prerequisite for CRM. For them, it means that the customer is the center of all activities undertaken to build a lasting relationship. It can then be seen as a strategic choice for the company as it allows it to listen to its customers and their needs. It then imposes a particular form of organization and a suitable management methodology. Moreover, Khodakarami and Chan (2014) found that CRM Operational systems facilitate socialization with customers. Saxe and Weitz (1982) attempt to conceptualize the customer orientation as an individual concept. The authors define vendors' customer orientation as a practical marketing concept on an individual level. The marketing concept requires that an organization determines the needs of target customers and adapts to meet them better than competitors (Saxe and Weitz, 1982). Brown, Mowen and Licata (2002) apprehend the client side of the service personnel orientation and consider the client orientation of the contact person essential for the market orientation of the service organization. Brown and al (2002) define customer orientation as the tendency or disposition of the employee to meet the customer's needs in the context of his work.

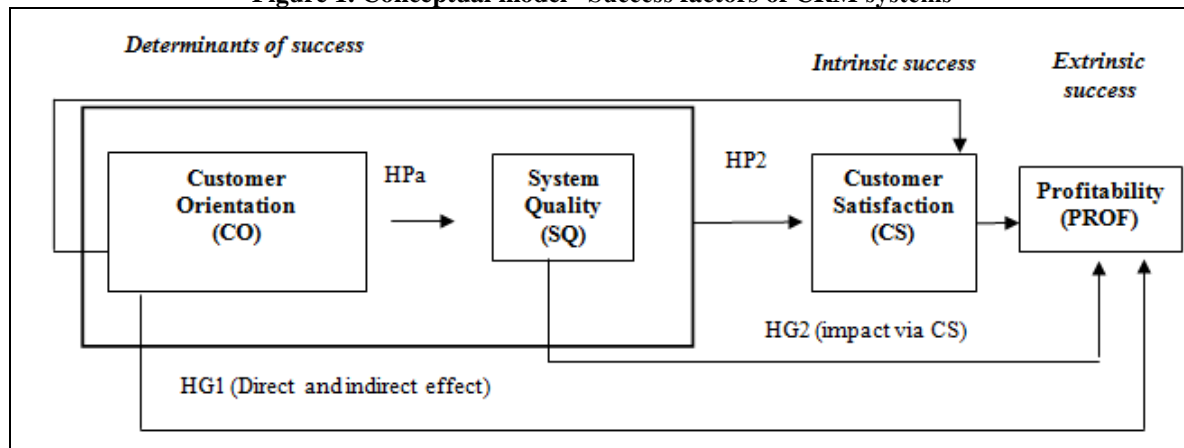
Regarding the role of salespeople in the success of CRM implementation, Ahearne and al (2010) find that salespeople who have a strong “learning orientation” experience a deeper initial performance decline but a greater performance recovery over time. The customer orientation of service staff that is in contact with the customer is a self-assessment of the tendency of employees to meet the needs of customers and the degree of pleasure they experience in meeting these needs. The degree of customer orientation of personnel in contact allows the employees to be more responsive to customers and meet their needs, which can improve their satisfaction and their loyalty. Sin, Tse and Yim (2005) assert that the orientation towards the most important customers is a key component of the CRM concept. The authors find a positive correlation between customer orientation and marketing performance as it is measured by the trust and satisfaction of customers.

*HP1- Customer orientation (CO) has a direct positive influence on customer satisfaction (CS).*

*H Pa -The customer orientation (CO) has a direct positive influence on the quality of the system (SQ).*

*HG1- Customer orientation (CO) has a direct and indirect positive influence (via customer satisfaction) on profitability (PROF).*

**Figure 1. Conceptual model “Success factors of CRM systems”**



## METHODOLOGY AND DATA COLLECTION

To answer the research question: What are the critical factors for the success of the CRM system, the hypothetical-deductive type process was adopted.

### Field of research

The field of investigation is the contact centers belonging to Tunisian companies. Our unit of analysis is the user of the CRM system such as: TV adviser, the telemarketer or the tele-actor or tele-operator in general (customer advisor, sales consultant, responsible for support). According to Lee (2006), contact centers are "strategic business units that influence customer behavior and not just a necessary cost of doing business." The choice of this field of investigation is justified by the fact that these centers are entities that use the most of CRM systems on Tunisian territory. This study chooses internal contact centers as there are entities belonging to the enterprise. These centers can assist customers with technical support, with telesales and with after sales service. They also assist the staff in case of technical problems to perform their daily tasks in a suitable manner.

### Target population and sample

To determine the composition of the national population centers for internalized contacts, we contacted "Oxia", a company that specializes in consulting and CRM, and the Sfax business center that gave us two key sources of information: The 2006 and 2007 guide of "Call Center and CRM in Tunisia" published by "Tunisia IT", the newspaper of the Net Economy and Management; and the " Magazine Call Center " which is a call center magazine. The redundant companies, which are cited in two sources, are then eliminated. We also consider companies using only the phone and not a CRM system as inappropriate for the research sample.

### Questionnaire and operationalization of variables

The explanatory nature of the research and the significant number of CRM users surveyed justify the use of a questionnaire. The construction of the questionnaire consists in developing a scale for each variable

items inspired by previous work experience. Each variable is measured by a 5 point multidimensional Likert-type scale. Extreme positions respectively indicate "Strongly Agree" and "Strongly disagree". Four versions of the questionnaire were required to get the final one. The presentation of the first version to the director of research improved it. A second version was submitted to the teachers/researchers in Marketing. The third version was submitted to the developer of CRM solutions and to computing manager of the company "Systel", which is an integrator of CRM solutions. The fourth version was pre-tested with five respondents face to face in order to note their comments. This pre-test helped clarify some terminology, adapt some questions and clarify the most ambiguous concepts for respondents. These corrections have helped shape the final version of the questionnaire.

**Table 1. Synthesis of the concepts and research variables**

<u>Conceptual levels</u>		<u>Concepts</u>	<u>Variables</u>	<u>References</u>
<i>Success Factors</i>	<i>Human Factors (Customer Orientation )</i>	<b>Customer orientation</b>	<u>CO</u>	Saxe and Weitz (1982), Brown and (2002); Parasuraman, Zeithmal et Ber (1988); Mukherjee and Malhotra (2006), Wa (2001), Rai and Bajwa, 1997; Crote and Li, (2003)
	<i>Technological factors (System quality)</i>	<b>System Quality</b>	<u>SQ</u>	Guimaraes, Staples and McKeen (2007), DeLone and McLean (2003).
<i>Intrinsic success</i>		<b>Customer satisfaction</b>	<u>CS</u>	Roh and al(2005), Fornell (1992)
<i>Extrinsic success</i>		<b>Business profitability</b>	<u>PROF</u>	Roh and al. (2005), Ngobo and Ramaroson (2005)

## Data collection

Data collection lasted 2 months and 5 days, from 7 March 2008 to 12 May 2008. The questionnaires were then distributed to 11 different companies in Tunis and Sfax. After this period 290 questionnaires were received. The rate of return equal to the ratio between the number of responses collected and the total number of questionnaires sent was then 72.5%. From the responses received, only 265 were valid. The reasons for rejection of non valid questionnaires were either the status of the respondent or the lack of suitable information.

## RESULTS AND DISCUSSION

### Descriptive analysis

The analysis of 265 usable responses describes the main characteristics of the sample. The selected criteria were gender, age, education of the respondent, the nature of the operation, seniority in the company and the industry. This analysis shows that the majority of respondents were women aged between 20 and 30 (65.3%), have a significantly higher level of education (37.7% have Bachelor's degrees, 15.1% have Master's degrees, 34.3% have a dual), and have worked for 2 to 4 years in the business (38, 5%). The majority of respondents (77.7%) are in charge of receiving calls at internalized contact centers. In addition, most of the respondents work in the service sector, including telecommunication (78.1%). This breakdown shows that in the Tunisian context, this sector is a pioneer in the use of CRM solutions. Companies in this sector are more oriented towards customer loyalty.

## Multivariate analysis

Descriptive analyses establish the validity and reliability of the measurement scales of the research variables. The principal component analysis (PCA) technique ensures the factorial composition and the dimensionality of the scale. The results confirm the dimensionality of SQ, CS and PROF. The results also support the multidimensional structure of CO. The values of Cronbach's alpha indicate a sufficiently high internal consistency. However, SQ2 is removed from the analysis due to its low reliability. The explanatory analyzes test the hypotheses proposed in the research use, for each variable, score factors identified by the PCA.

**Table 2. Validation of scale measuring variables**

Variables		Items	Factorial contribution	Factorial contribution (Each var. separately)	Cumulated variance	$\alpha$ Crombach
<b><u>Human factors</u></b> <b><u>Customer Orientation</u></b>	Customer orientation value	CRM system is perceived to have a great value	0,571			
				0,765	47,693	0,811
		It is my pleasure to respond to my clients quickly	0,716			
		I am satisfied when I satisfy my clients	0,750			
		I like to serve my clients	0,792			
		I try to help my clients achieve their objectives	0,705			
		I try to solve my clients' problems	0,685			
		I am able to respond to my clients questions	0,587			
	Relational capacity	I find it easy to smile at each client	0,745			
		I like to remember my clients' names	0,745	0,726	48,160	0,731
		It is natural to	0,582			

		have empathy for my clients				
		I look for clients to speak about their service needs	0,696			
		I remember my clients' needs	0,689			
	Customer orientation behavior	When the client has a problem, I give him a special attention	0,705	0,785	49,963	0,797
		I have the capacity to respond to my clients' questions	0,739			
		My behavior/speech inspire my client's trust -	0,656			
		I explain to each client each step taken to respond to their question-	0,719			
		When problems arise, I give them all my attention in order to solve them quickly	0,775			
		I give my clients a quick service	0,637			
	Competency (related to the contact with the client)	When I give a promise to a client to achieve task in a timely manner, I do it	0,795	0,726	61,453	0,681
		I carry out the task appropriately since the first time	0,851			
		I understand the specific needs of my clients	0,698			
<b><u>Technological factors</u></b> <b>Quality of the</b>	System quality	The CRM system gives instant results	0,709			

system				0,768	58,006	0,817
		The CRM system gives reliable results	0,752			
		The CRM system gives a quick answer	0,751			
		The system gives concise results	0,802			
		The system gives complete results	0,792			
<u>Intrinsic success</u>	Customer satisfaction	Interactions with Customer increased following the implementation a CRM system	0,728			
					50,868	0,668
		The implementation of the system improved the branding	0,620			
		Complaints and claims decreased following the implementation of the CRM system	0,696			
		The level of satisfaction of the client has globally increased following the implementation of the CRM system	0,796			

<b><u>Extrinsic success</u></b>	<b>Profitability of the business</b>	Following the CRM implementation, the number of new customers has increased.	0,851			
		Following the implementation of a CRM system, sales have increased	0,875		71,602	0,868
		Following the implementation of CRM, the loss of Customer has decreased	0,826			
		Following the implementation of CRM, the overall profitability has increased	0,832			

The goal of the explanatory analyses is to verify the research's partial hypotheses (HP) and the general ones (HG). The methods of analysis are the linear regression and the path analysis.

### The verification of the partial hypothesis HP: (CS ----- PROF)

The profitability variable (PROF) was the subject of a simple linear regression with the explanatory variable being customer satisfaction (CS). Customer satisfaction explained 30.7% of the variation in profitability and the risk threshold  $p = 0.000$ . The HP hypothesis reflects the existence of a direct dependence between the intrinsic success (customer satisfaction) and the extrinsic one (profitability of the company).

**Table 3: Result of the simple linear regression**

Explicative variable	PROF ( <i>Profitability</i> )
CS ( <i>Customer satisfaction</i> )	0,554***
<b>Determination coefficient</b>	30,7%
<b>Fisher Coefficient</b>	116,709
<b>Signification of F :(<math>\alpha</math>)</b>	0,000

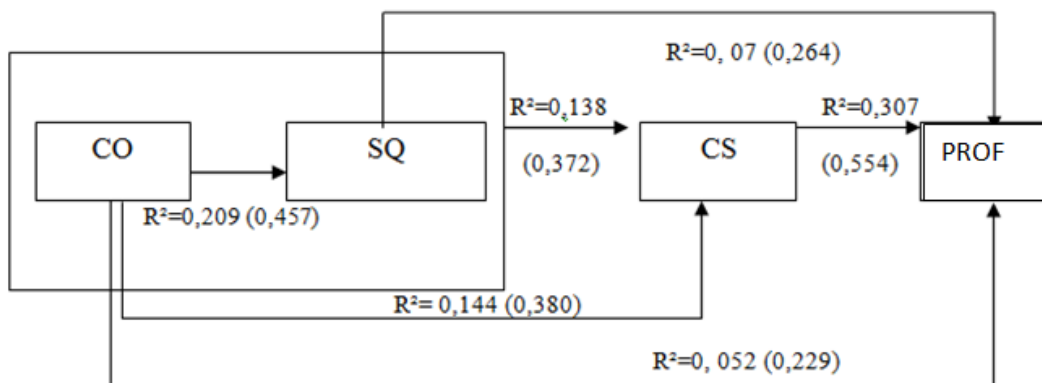
\*\*\* $p < 0,01$     \*\* $p < 0,05$     \* $p < 0,1$  ns : not significant

### Verification of general assumptions HG

The general assumptions are based on an analysis of direct and indirect causality links of explanatory variables measuring the determinants of the success (PROF) through an intervening variable (CS).



**Figure 2. Results of linear regression**



The analysis of pathways is performed on the variables in the model based on the results of the correlation analysis and the linear regression. The analysis only considers significant coefficients between the dependent variable and the variables of the first level. The standardized partial regression coefficients are significant at a risk level  $p = 10\%$  (Evrard and al, 2003).

The explanation for the profitability of the company finds its justification in the direct and indirect influence of the "customer orientation" and the "quality system."

**Table 4. Result of pathway analyses**

H	Pathways	Direct Effect (ED)	Indirect effect (EI)	Total effect (ET)	Correlation coefficient	Non Causality (NC)
HP	CS $\Rightarrow$ PROF	0,554		0,554	0,554	0
HPa	CO $\Rightarrow$ SQ	0,457		0,457	0,457	0
HP1	CO $\Rightarrow$ CS	0,380	0,170	0,550	0,380	-0,17
HG1	CO $\Rightarrow$ PROF	0,229	0,094	0,323	0,229	-0,094
HP2	SQ $\Rightarrow$ CS	0,372		0,372	0,372	0
HG2	SQ $\Rightarrow$ PROF	0,264	0,042	0,306	0,264	-0,042

An in-depth analysis of the results of the empirical study determines the factors influencing the success of CRM systems through the study of their influence on customer satisfaction, and their direct and indirect impact on the profitability of the company.

Customer satisfaction as a measure of intrinsic success and its influence on the profitability of the company: Customer relationship is among the major concerns of companies with contact centers and customer service departments. The ultimate goal is customer satisfaction and needs for an improved customer loyalty and an increase in the profitability of the company compared to its competitors. To do so, these companies make every possible effort to achieve this goal. Highly qualified employees are then recruited. They are motivated and have a relational culture, an ability to listen, and the required training. Information technologies are used to help these companies manage interactions with customers and optimize relationships by exploiting data warehouses where the history and traces of all contacts are found. These warehouses are at the heart of the CRM systems. These CRM systems optimize the decisions taken by the users, enable them to deliver a better service and also allow the customization of contact with the customer. There is then a sense of recognition that could be established between the client and the company. Satisfied customers use the services of the contact center to fulfill their needs in the best conditions. A faithful relationship is established between the company and client. A satisfied customer could advise and encourage other potential customers to use the center by telling them about the

quality of its services. This will lead to an increase in the number of new customers and in overall profitability as well. This result confirms the Roh and al (2005)'s conclusions postulating the existence of a positive and significant influence of customer satisfaction on profitability.

The determinants of success and their impact on profitability: Analyzes that are performed at the first conceptual level on five variables have identified two factors: "customer orientation" and "quality of the system". The results of the linear regression and the analysis of the pathways show that all determinants have an impact on the profitability of companies with internalized contact centers. The results show that customer orientation has a direct positive effect on the quality of the system. Employees are willing to help customers and are pleased to serve them. Support from the management and the allocation of adequate resources for the adoption of the CRM system and the encouragement of employees to use the system in their daily work results in an efficient and high quality customer relationship system. This result supports the Deshandé, Farley and Webster (1993) study that pointed the causal relationship between market orientation and innovation on the one hand; and performance on the other one.

All dimensions of customer orientation have a significant and positive effect on the profitability. This variable indicates that interacting and serving the customer is inherent for the employee's pleasure. These results are coherent with previous conclusions that confirm the existence of an optimum level of salesperson customer orientation with regard sales performance (Homburg and al, 2011). The employee feels comfortable and at ease when responding to customer requests. This ease will be felt by the customer, and an air of mutual understanding is established between staff and their contacts. Satisfaction indicates that employees are motivated and able to listen to customers and serve them better, which can improve customer satisfaction and customer loyalty. This could also improve the company's profitability. These results support those of Sin, Tsi and Yim (2005) who found a positive correlation between customer orientation, trust and customer satisfaction. "The quality of the system" construct confirms a three dimensional structure: the quality of the system, the quality of client information and the convenience of the system. The first dimension relates to the characteristics of the output of the system (quick response and immediate results, reliable and complete). The second relates to the usefulness and the integration of the client information. The system convenience relates to the ease of use. The results show that the efficiency and convenience of the system have an influence on the profitability through customer satisfaction. An effective system is one that provides accurate, reliable, complete and immediate results. These performances and quality characteristics encourage users to provide better services. Customers are then satisfied and profitability improves. These results are close to conclusions of Roh and al (2005) and DeLone and McLean (2003) asserting that the quality of the system indirectly influences the company's net profits.

## CONCLUSION

The originality of this research lies in the empirical validation of the conceptual model with 265 users of CRM systems in internalized contact centers belonging to Tunisian companies. The high turnout is indicative of the importance of the subject and of its relevance. The objective is to highlight the theoretical, methodological and practical contributions and then expose the limitations of the research in terms of scientific validity and research paths. This research focuses on the success of CRM as an information system in the specific context of Tunisian contact centers with internalized system. The review of the literature dealing with the different models of IS success in general and particularly of CRM system has enabled us to build a conceptual model dedicated to measuring the success of CRM solutions used in contact centers generally related to the operational CRM. The conclusions are conforming to previous results in marketing and Information System fields. This study is aimed at researchers in information systems, especially those working on CRM solutions and who are interested in the reasons of their success. The proposed model can provide some answers to this question in a specific context of contact centers. This model can be improved if tested in other contexts.

In terms of methodology, the hypothetical-deductive approach has helped us meet the explanatory nature of the problem and the research objectives. All these considerations lead us to adopt a quantitative

method of investigation for data collection from a large sample of users. The contributions of methodological order reside mainly in the use and justification of two methods of data analysis: linear regression and pathway analysis.

This study is of importance to managers and company directors. A successful implementation and use of CRM solutions enable them to gain productivity and efficiency, optimize the contact management and retain customer. Moreover, this research attempts to highlight the role of customer orientation for contact centers to support the recommendations for these organizations to get help from marketing specialists. Managers should strengthen the quality and the validity of CRM systems, increase the level of customer's orientation to service and satisfy the customers. To do so, a high level of technical competences as well as a high level of management commitment to the system must be present at the managerial level of the organization. This study is also of a crucial importance for contact and customer service centers. All factors of success of CRM systems identified in this study should be considered to improve their customer satisfaction and business profitability.

This study should also be considered by designers and developers of CRM systems: An effective system, with good quality and high performances (response time, reliable performance, complete, accurate) is crucial to improve the profitability of the company. In addition, the knowledge of the business processes helps the programmers designing the appropriate system regarding the activities of the company. The information and the statistics produced by the CRM system are appropriately taken into consideration in the decision making process.

## **Limitations and future guidelines**

Although the research model is inclusive of technological and marketing dimensions, it has inherent limitations related to the complex nature of the process of measuring the success of CRM systems. The evaluation of customer satisfaction by the contact personnel may not give an accurate representation of the studied variable. In addition, although the proposed model has tried to define and outline the success of CRM, it does not fully reflect the reality of the proposed relationships. Other categories of variables such as organizational and strategic ones may provide a better representation of the problem. In terms of methodology, although the sample is composed of 265 users, the scope was limited as it touched a specific channel of communication with the customer, meaning the contact center, which represents an operational level of the study. The results couldn't then be extrapolated to other companies adopting other types of CRM such as collaborative or analytical CRM.

Future avenues of this research are methodological and theoretical. In terms of methodology, the research can be conducted on a sample of users in external contacts centers (outsourcing) or working for foreign companies (offshore). It could also be conducted on a larger number of contact centers providing the same service. It would be interesting to conduct comparative studies in different contexts. On the theoretical level, future researches are needed to study the effect of more organizational and individual variables on the success of CRM systems.

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# THE RISE OF THE RENMINBI FROM CONVERTIBLE TOWARD RESERVE CURRENCY STATUS AS A RESULT OF THE CHINA-US TRADE RELATIONSHIP

*Robert G. Vambery*

## ABSTRACT

*An increasing portion of China's international trade moved away from being denominated in US Dollars to being denominated in Chinese Renminbi. This is in part the result of China's many years of trade surpluses with the US which enabled the PRC to build a \$4 trillion financial hoarding of hard currency assets.*

*Though further reforms to its internal financial system need to be made before the Renminbi will be held in significant quantities by central banks, the acceptance of the Renminbi by a number of China's trading partners as a unit of account in trade reduces dependence on the Dollar in international trade.*

*This paper examines some of the measures pursued by the PRC that enabled its currency to progress from inconvertibility to convertibility and now toward reserve currency status. It also examines some of the reasons for the relative decline in the Dollar's dominance. The paper concludes with findings on what both economic powerhouses should do to enhance their respective positions as they compete against each other in international trade.*

Key words: China businesses, Emerging market, Foreign currency issues.

## INTRODUCTION

Although the US Dollar is not the only reserve currency as of spring 2014, its role in international finance in both commercial and Central Banks operations continues to be dominant relative to other actual reserve currencies such as the Euro, the Japanese Yen and the Swiss Franc (Chinn, Frankel, 2008).

Given that the magnitude of the economy of the People's Republic of China is second only to that of the United States and that the PRC is among the first five trading nations of the world, even if the trade volumes of the 28 countries of the European Union are aggregated into one numerical entity, it is somewhat surprising that the PRC's currency, the Renminbi, is not only not a reserve currency but it is not even a fully convertible fiat issue (Gao, 2013).

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Nonetheless, over the past seven years from 2007 to 2014, the Renminbi has been moving in the direction of greater acceptability and greater convertibility.

Should the Renminbi be welcomed into the category of convertible currencies? That depends in part on US-China economic relations and on how China would be using its strengthened currency: Would China allow the Renminbi to function as a normal instrument of commercial exchange and a store of value or would China use the strengthened Renminbi as a tool for the mercantilist exploitation of its trading partners (Mathews, 2006)?

The Dollar has become a leading reserve currency after World War I in conjunction with the British Pound, often referred to as the *Sterling*. Toward the end of World War II, with the establishment of a world financial system within the framework of the Bretton Woods Agreement, the Dollar emerged as the supreme reserve currency (Gardner, 2008).

Two major works were published recently that subjected to in-depth examinations the merits of the supremacy role assigned to the Dollar. The study by Barry Eichengreen was published with the accusatory title of *Exorbitant Privilege: the Rise and Fall of the Dollar and the Future of the International Monetary System* (Eichengreen, 2011). The study by Esward Prasad had a similarly ominous title, *The Dollar Trap* (Prasad, 2013).

Eichengreen offers a historical analysis of the benefits that accrued and continue to accrue to the United States by virtue of its position of being able to create a universally acceptable currency. Simply by printing its own currency, the US can create wealth and riches for itself. Given that most other countries cannot do this or can print universally acceptable currencies only in proportionately smaller quantities, provides the United States the exorbitant privilege.

It should be observed that the existence of an important privilege is clear. The United States, unlike many countries, does not need to first succeed in producing goods and services for export and collect accounts receivables from its customers in order to earn the funds with which it can purchase essential and desirable imports. The US can place purchase-orders and pay for delivered goods and services by printing money or issuing other debt instruments. This is a process which involves the acquisition of real goods and services in exchange for financial instruments which eventually may or may not need to be converted into real goods or tangible assets.

Moreover, the US can incur substantial amounts and even vast quantities of debt owed to foreigners, because ultimately it can discharge the debt obligations through increasing its own money supply by printing money.

Eichengreen then considers not only the privilege but also the possible decline associated with the reserve currency status of the US Dollar. (Eichengreen, 2011)

In the more recently published “The Dollar Trap”, Prasad (2012) delivers a comprehensive historical analysis of the role, performance, and impacts of the Dollar. Somewhat similarly to Eichengreen’s work, his study also addresses the possible decline associated with the reserve currency status of the US Dollar.

The discussions presented in the coming pages, focus on how what the US does helps to reinforce the role of the Dollar as the supreme reserve currency, how what China does improves the convertibility of a Renminbi and moves it in the direction of a reserve currency status, and how what the US does to weaken its own economy automatically enables the Renminbi to accelerate its progress toward reserve currency status.

## LITERATURE REVIEW – SOME RECENT STUDIES

For the Asian Development Bank, Jong-Wha Lee raised the question “Will the Renminbi Emerge as an International Reserve Currency?”

The author argues (Lee, 2012) that the world needs more currency alternatives in addition to the dollar, Euro, and the Yen in order to strengthen the global reserve system. He notes that as the country grows, the People’s Republic of China’s currency, the Renminbi, emerges as a new international currency. However, the Country needs a better financial system and much more convertible capital accounts in order to turn this into a reality.

The author conducts a simulation showing that the Renminbi would become internationalized eventually making up 3% to 12% of total international reserves.

The simulation estimates that it may take as long as until 2035 for the Renminbi to become adequately convertible if the average GDP growth rate will be only 6%, but could take considerably less time under the recent rapid growth rates of 9% per year. Several reasons are cited favoring the rise of the Renminbi to reserve currency status including the unlikelihood of the emergence of an East Asian currency union and the already functioning bilateral swap agreements among regional central banks including the Bank of Korea, Hong Kong, China, Malaysia, Belarus, Indonesia, and Argentina.

The article leaves an unsatisfactory feeling associated with the estimate of the future reserve currency role of the Renminbi reaching 3% to 12% of global Central Bank Reserve Bank holdings, because this is a 4 to 1 ratio implying only marginal acceptance at 3%, but an important role at the 12% magnitude.

In their study, “The Potential of the Renminbi as an International Currency”, the authors Chen, Peng, and Chang (2009) examine conditions which favor a currency becoming a component or contributor to central bank reserves. They find a positive relationship between the share of GDP in the world and the share of central bank reserve holdings in the corresponding currency. Economic size presents a de facto limitation on the convertibility of small economy currencies. Conversely, large trade activities generate a large market in foreign exchange, well diversified economies bring reliance on their own currencies for settlement, and liquid open financial markets give better opportunities for investments.

Two other often used indicators include inflation and exchange rate volatility. The higher the inflation, the bigger the loss of purchasing power of the currency and the more volatile the exchange rate, the higher the risk associated with holding the currency. The authors found that based on official statistics, China’s average inflation rate over ten years was lower than that of the US and that Renminbi volatility was similar to that of the US and lower than that of the Euro, the Pound, and the Yen.

These factors then lead to more participants using the currency and more people finding it convenient to use that currency in a self-reinforcing process that creates a positive network effect.

The paper observes that the decline in the reserve share of the USD from 71% to 64% may imply a decline in the desirability of holding dollars. However, this observation is not necessarily accurate as the reduction in the portion of reserve currencies accounted for by the dollar may be a result of the growing international roles played by the pound and the euro. Despite the reduced portion, the absolute quantity of dollars held in central bank reserves may have not only remained constant but actually increased.

The authors’ empirical results show that the size of the economy including market development and persistence and network effects are the key determinants for a currency’s share in world reserves. Additionally, the Renminbi is playing an increased role in affecting regional currency movements. They show that the Renminbi’s potential as a reserve currency is becoming comparable to that of the Japanese Yen and British Pound.

The issue of the potential impacts of rising Renminbi to Dollar exchange rates on the China-US bilateral trade relationship and on the impacts of substantially increased Chinese export volumes on world trade was examined by Hilland, A. and Devadoss, S. (2013) in their article entitled, "Implications of Renminbi/Dollar Exchange Rate for Trade" in the Journal of International Trade Law and Policy.

They examine the effects of an undervalued Renminbi on Chinese trade with the US and other countries and review the history of changes in Renminbi valuation, its pegging to the dollar between 1995 and 2005 and the responses to complaints about alleged undervaluation.

In the US Congress, attempts were made to bring pressures on the Renminbi through legislative actions. These include the proposed China Currency Manipulation Act of 2008 whose objective was to ensure that the value of the Renminbi is adjusted through an international institution, the IMF. Subsequently, the Currency Reform for Fair Trade Act of 2009 was proposed countervailing duties to aid companies harmed by undervalued currencies and gave the Department of Commerce the power to decide whether a currency was undervalued. In 2011, the Currency Exchange Rate Transparency Act was introduced with the purpose of requiring proof that countries wanting to enter into a trade agreement with the US have not manipulated their currencies during the ten years prior to signing.

None of the three acts became law, because they could not pass both Houses of Congress. Moreover, it is unlikely that they would have received Presidential approval because of the very aggressive measures that they mandated. However, proposals of this nature can be used in multilateral and especially bilateral trade and financial negotiations. The authors find that there were not only direct effects on the US and China trade, but also indirect effects the prevailing exchange rates had on third party countries. They provide evidence that the undervaluation of the Renminbi against the Dollar causes the US to import more from and export less to China contributing to the enormous bilateral trade deficit of \$2.8 trillion from 1985 to 2012.

## **THE PROGRESS OF THE RENMINBI WILL BE INFLUENCED BY THE PERFORMANCES OF THE US DOLLAR AND THE US ECONOMY**

The importance of the international role of the Renminbi rises if the international role of the Dollar declines. It appears that through enormous deficits and unsuccessful spending programs, the US Government is causing damage to the Dollar and to the US economy in the intermediate and long runs (Bergsten, 2009). This gives an advantage to China and its Renminbi; the Government of China can take fewer measures to make the Renminbi stronger if the US dollar is being made weaker.

## **It Is Time to Acknowledge the Reality that China Is Not Poor and the US Is Not Rich!**

Many observers see the enormous wealth of the United States and find it difficult to even consider the proposition that the US is not rich (Marazzi & Sheets, 2007).

But while China has nearly \$4 trillion in hard currency assets, the US has \$18 trillion in national debt. In addition, the US government has \$80 to \$100 trillion in unfunded long term payment obligations (Congressional Budget Office, 2012).

When the Federal Government is faced with the task of balancing its budget each year, it is obliged to rely on its ability to sell bonds to the People's Republic of China (Morrison & Labonte, 2008).

Therefore, it is time to stop using the single-entry bookkeeping method when ascertaining America's wealth position:

Normally, in the preparation of national accounts reports, accountants use double-entry book keeping with one side of the ledger listing the values of the nation's assets and the other side of the ledger listing the values of the nation's liabilities (Davig *et al*, 2010). However, in thinking about the wealth status of the US, the tendency has been to add up the numbers on the asset side of the ledger and not even consider the liabilities side. That way, the US always comes out as not only the world's most powerful country, but as the richest one also (International Monetary Fund, 2013).

## US GOVERNMENT ACCOMPLISHMENTS VERSUS CHINESE GOVERNMENT ACCOMPLISHMENTS

The US increased the Government's portion of its GDP from less than 20% to about 25% with nearly all of the increases being financed with borrowed money. Sadly, there is very little to show for the huge expenditures. The government having spent trillions of dollars over and above its revenues, it is reasonable to ask the question: Where are the rebuilt or newly built cities, the newly created energy systems, the new infrastructure projects or the millions of better educated children?

**Table 1. US National Debt and the Size of Debt Owed to Foreigners (in Billion Dollars)**

Years	US NATIONAL DEBT	AMOUNT OWED TO FOREIGNERS
1970	\$371.00	\$15.70
1980	\$908.00	\$124.40
1990	\$3,233.00	\$461.80
2000	\$5,674.00	\$1,049.90
2008	\$10,025.00	\$2,743.30
2009	\$11,910.00	\$3,495.60
2010	\$13,562.00	\$4,176.90
2011	\$14,790.00	\$4,767.20
2012	\$16,066.00	\$5,480.00
2013	\$16,738.00	\$5,724.00

Source: <http://useconomy.about.com/od/usdebtanddeficit/a/National-Debt-by-Year.htm>; FRED St. Louis

There are incessant claims of waste, inefficiency and corruption in China. These may be largely true but even so it is necessary to look at the accomplishments achieved in China despite all the problems. There are new airports, giant dams, huge power plants, sophisticated military hardware, a major space program, and 7 million college graduates per year, up from only 2 million a few years ago. Even more impressive, China has become the manufacturer to the world and per capital incomes are up 3 to 6 folds in a little more than two decades. All these monumental accomplishments involved little additions to the public and publicly guaranteed national debt owed to foreigners (World Bank, 2012).

Yet foreign advisors tell China: "Shift from your export led economic growth to domestic consumption-driven economic expansion" (Akyüz, 2011). This may be bad advice from China's wealth creation and accumulation viewpoints, because consumption is often a form of capital destruction while exportation and export surpluses constitute the production and capital accumulation processes that helped to make China rich.

It should not be forgotten that China became rich relative to how it was twenty to thirty years ago in part by producing and selling lots of products to foreign countries, thereby earning large quantities of hard currency.

The US developed its big negative asset position in part by consuming a lot more than it produced, thus giving away large quantities of its hard currency.

**Table 2. US Net Asset Position with the World (in Billion Dollars)**

<b>Years</b>	<b>NET ASSET POSITION</b>
<b>1970</b>	\$722.26
<b>1980</b>	\$360.84
<b>1990</b>	\$(245.35)
<b>2000</b>	\$(1,388.70)
<b>2008</b>	\$(3,260.20)
<b>2009</b>	\$(2,321.80)
<b>2010</b>	\$(2,473.60)
<b>2011</b>	\$(4,030.30)
<b>2012</b>	\$(4,416.20)

Source: [http://www.bea.gov/scb/pdf/2012/07%20July/0712\\_iip.pdf](http://www.bea.gov/scb/pdf/2012/07%20July/0712_iip.pdf);  
[http://www.bea.gov/scb/pdf/2006/07July/0706\\_IIP.pdf](http://www.bea.gov/scb/pdf/2006/07July/0706_IIP.pdf)

What happened? The answer is that “the US consumed the money”! The importation of vast quantities of often low priced consumer goods gave US citizens a higher standard of living for which the Nation has not paid yet (Amiti and Freund, 2010).

The path to a positive payoff for the people of China has been hard work, knowledge acquisition, wealth creation, prestige gathering and power building leading to a more acceptable Renminbi.

## **THE FUTILITY OF CURRENCY MANIPULATIONS AND CURRENCY REVALUATIONS**

Although not by the official designation of the United States Treasury, China is repeatedly and resoundingly labeled a “currency manipulator” (Bergsten, 2010). The implication of this maybe that Chinese financial authorities intervene in currency markets in such a way that the exchange value of the Renminbi should be positioned artificially low on a purchasing power parity basis against the hard currencies of the world, especially the US Dollar.

Though the Renminbi has been quite undervalued at times and may still be undervalued even though now by a significantly smaller margin, it should not be forgotten that the Renminbi is a pegged currency, aligned to the Dollar. Pegging requires that its value should remain constant against the Dollar as the value of the Dollar moves up or down against other convertible currencies. This fixed, pegged relationship can only be achieved and maintained through continuous intervention in currency markets. Another appropriate term for intervention in this instance could be the term *manipulation*. It could be argued that the issuer of any pegged currency has no choice or is by definition a currency manipulator.

From the viewpoint of US concerns, it is recognized that appropriate revaluations or devaluations can be helpful in reducing trade deficits or increasing trade surpluses. But no, these are not long term solutions to the challenge of persistent bilateral trade deficits or to the challenges of international competitiveness.

The experiences with the Japanese Yen, Deutsch Mark, and Swiss Franc revaluations clearly demonstrate this point. Prior to the breakdown of the Bretton Woods Agreement based international financial system, Japan had to pay 360Yens, Germany had to pay 4 Deutsch Marks and Switzerland had to pay 4 Swiss Francs for 1 US Dollar. Substantial deficits in the trade relations of the US with these three nations were significant contributors to the inability of the US to stay on a fixed exchange rate system and to keep open the gold window at least for the Central Banks of other IMF member nations. Over a period of about fifteen years, the three above mentioned currencies were and remain revalued against the Dollar by about 70% to 75%. Japan now has to pay only about 90 yens, Germany only 1 Deutsch Mark (as a component of the Euro) and Switzerland only 1 Swiss Franc for 1 US Dollar. Despite these phenomenal revaluations of the three currencies, that are equivalent to a 75% devaluation of the US Dollar, substantial trade deficits unfavorable to the US economy continue to persist with all three trading partners (Taguchi, 1994).

“Before last November’s G-20 summit in Seoul (2012), Brazilian and Indian officials joined their US and European counterparts to complain that China manipulates the value of its currency. Yet when the Americans raised the issue during the forum itself, Brazil’s finance minister complained that the US policy of “quantitative reasoning” amounted to much the same unfair practice, and Germany’s foreign minister described US monetary policy as “clueless” (British Broadcasting Corporation, 2010).

Beyond Europe, those who make policy, whether in a market-based democracy such as the United States or an authoritarian capitalist state such as China, must worry first and foremost about growth and jobs at home. Ambitions to bolster the global economy are a distant second concern. There is no longer a Washington consensus, but nor will there ever be a Beijing consensus, because Chinese style state capitalism is designed to meet China’s unique needs. State capitalism may be that rare product that China has limited interest in exporting (Bremmer and Nouriel, 2011).

## **THE PROTECTIONIST CHALLENGE IN US—CHINA TRADE**

The deficits of the US in its trade with China are so enormous as to be legendary. Two contributing reasons to this persistent deficit are 1) China’s pursuits of its enlightened self-interest and its *de facto* avoidance to buy from America and 2) on America’s side self-indulgent consumption and the pursuit of cost reductions in purchases and in production. China knows that it is in its interest to rely on domestic suppliers in products and services in which it can be self-sufficient and to sell as much as possible to the US in exchange for hard currency, capital goods, raw materials and energy substances, as well as services. Furthermore, technology purchases help to enhance China’s wealth-producing capabilities (Wang and Wang, 2013). This process provides the US with many happy consumers. However, it also causes many job losses in the US and the disappearance of many American production systems and of entire corporations.

Over the years 1990 to 2012, China achieved a 6 to 1 and more recently a 4 to 1 trade relationship with the US. This means that for every six Dollars China earns through its sales to the US, it only returns 1 Dollar in purchases of US products and services. This is clearly an engine of wealth creation for China and an engine of impoverishment for the US. Some consolation may be derived from the change that this unbalanced trade relationship is moving to a 4 to 1 ratio and improving.

**Table 3. US Trade Deficits in Billion Dollars (Merchandise & Services Trade combined)**

<b>Years</b>	<b>Trade Deficit</b>
<b>1980</b>	\$(19.41)
<b>1985</b>	\$(121.88)
<b>1990</b>	\$(80.86)
<b>1995</b>	\$(96.38)
<b>2000</b>	\$(376.75)
<b>2005</b>	\$(708.62)
<b>2008</b>	\$(698.34)
<b>2009</b>	\$(379.15)
<b>2010</b>	\$(494.74)
<b>2011</b>	\$(559.88)
<b>2012</b>	\$(534.66)
<b>2013</b>	\$(474.87)

Source: <http://www.bea.gov/international/index.htm>

## **IN INTERNATIONAL TRADE CHINA ALMOST ALWAYS WINS**

It is very difficult for countries that are not principally raw material and unprocessed agricultural goods exporters to China to derive a substantial net income from export-import interactions with the PRC.

The decades-long running large annual deficits suffered by the United States in trading with Japan are known to trade analysts and to relevant government officials in many countries. As far back as in 1992, at an international conference held at George Washington University in Washington D.C., former Prime Minister of France, Madame Edith Cresson stated that “Europe is not going to allow China to do to Europe what Japan did (and does) to the United States”. Madam Cresson’s point was that Europe will not allow itself to be exploited by China through persistent and growing trade imbalances in favor of China and economically damaging to Europe. Nonetheless, as time went on, China did achieve huge trade surpluses against the European Union. By 2007, Europe also was incurring large trade deficits with China. The United States deficit with China was about \$260 billion while the trade deficit of the European Union with China reached about \$140 billion. This meant that China enriched itself in that year by nearly \$400 billion through trade with the North American and Western Europe (Chinese Government, 2008).

The African case may be even sadder. Africa’s exports to China are mostly in the energy, raw material and unprocessed agricultural goods categories. As such, there should be a significant potential for Africa to earn substantial accumulations of hard currency from its trade with the PRC. Yet this did not become the reality.

In the year 2000, the China-Africa bi-directional trade consisted of about \$5 billion exports and \$5 billion imports. By 2007, it rose to \$35 billion exports and \$35 billion imports. Despite the trade’s rapid growth, Africa’s exports led to very limited hard currency accumulation benefits for Africa.

**Table 4. China-Africa Trade Relations (in billion dollars)**

Years	China's Exports	China's Imports
1998	4.03	1.48
1999	4.08	2.38
2000	5.03	5.54
2001	5.97	4.79
2002	6.93	5.43
2003	10.16	8.37
2004	13.76	15.64
2005	18.64	21.11
2006	26.65	28.77
2007	37.25	36.23
2008	50.85	55.88
2009	47.72	43.18
2010	59.97	66.90
2011	73.08	93.14
2012	85.38	113.09

Source: the Tralac.org, *Global Trade Atlas*, August 14<sup>th</sup> 2013,  
<http://www.tralac.org/2013/08/14/africa-china-trading-relationship/>

## THE COMPOSITION OF TRADE DOES MATTER

The impacts of China-US trade are even more beneficial for the PRC and more damaging for the US than mere trade imbalance statistics indicate. Although the vast quantity and enormous variety of products imported from China mostly at favorable prices result in a higher standard of living and lower rates of inflation in the US, many of the imported products are not truly essential. Many other products which are in fact useful to their American buyers are produced in and imported from China not, because of any significant technological characteristics but rather because of lower production costs in China, that make lower retail prices to American consumers possible (Mayer and Vambery, 2008).

In contrast, China's purchases of products and services from the US include a greater preponderance of items that can be and are used to enhance that nation's economic power, including higher productivity for the PRC's economy, especially that of its manufacturing systems.

**Table 5. Major US Exports to China: 2005-2009 (\$millions and percent change)**

	2005	2006	2007	2008	2009	Percent Change 2008–2009 (%)
Oilseeds and grains	2,339	2,593	4,145	7,316	9,376	28.10%
Waste and scrap	3,670	6,071	7,331	7,562	7,142	-5.50%
Semiconductors and other electronic components	4,015	6,830	7,435	7,475	6,042	-19.20%
Aerospace products and parts (mainly aircraft)	4,535	6,309	7,447	5,471	5,344	-2.30%
Resin, synthetic rubber, and artificial & synthetic fibers & filament	2,127	2,548	3,290	3,524	4,036	14.50%

Source: USITC Data Web. Top five US exports to China in 2009.

China tends to import items that are essential for it, because they are inputs for production systems or because they are capital goods or because they incorporate technology and productivity enhancing knowledge.



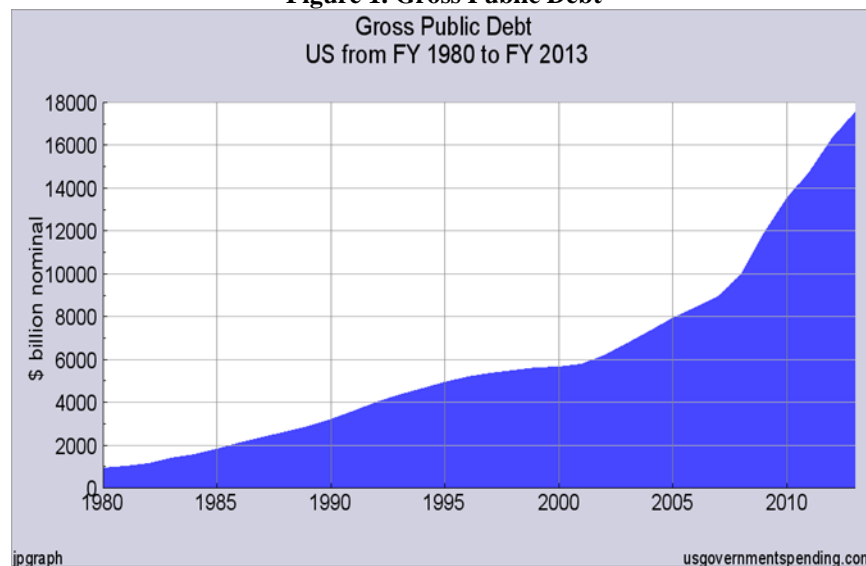
It is important not to assume that US imports from China are overwhelmingly made up of non-essential and short lived durability products, but it is important to be conscious of, to be informed about and to evaluate the effects of the mixture of essential versus non-essential and trivial imports.

**Table 6. Major US Imports from China: 2005-2009 (\$millions and percent change)**

	2005	2006	2007	2008	2009	Percent Change 2008-2009 (%)
Computer Equipment	35,467	40,046	44,462	45,820	44,818	-2.20%
Misc. Manufactured Commodities	26,449	28,888	34,827	35,835	30,668	-14.40%
Communications equipment	14,121	17,977	23,192	26,618	26,362	-1.00%
Apparel	16,362	19,228	22,955	22,583	22,669	0.40%
Audio and Video equipment	15,287	18,789	19,075	19,715	18,243	-7.40%

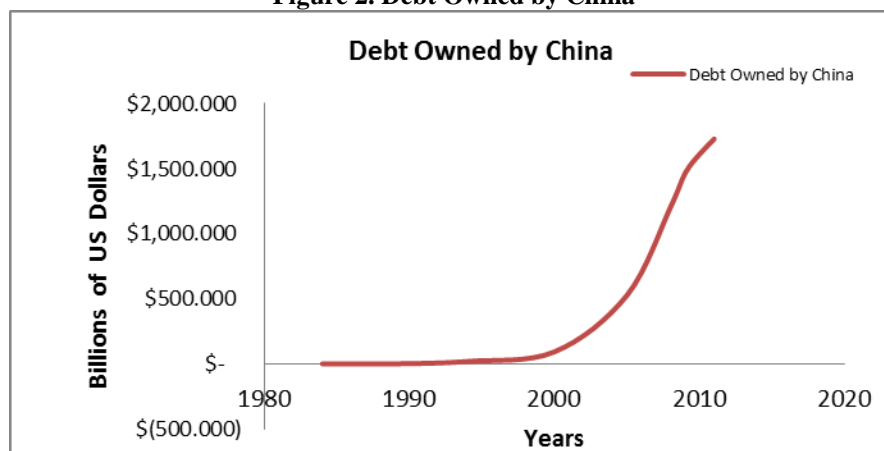
Source: USITC Data Web.

**Figure 1. Gross Public Debt**



Source: usgovernmentspending.com

**Figure 2. Debt Owned by China**



Source: <http://www.treasury.gov/resource-center/data-chart-center/tic/Documents/shllhistdat.html>

As an outcome of its importation expenditures, the US transfers to China the funds with which China buys useful capital goods and builds accumulations of Dollars. In exchange, the US receives lots of unimportant

consumer goods that make life more enjoyable but that provide little contributions to permanent economic growth.

It is true that as a result the people of the US become happier but they also end up with a weaker and debt ridden economy. Figure 1 and Figure 2 above show the growth of the “Public Debt” of the US and the amount of this “Debt Owned by China”.

## WHAT WILL BE THE NEXT PHASE IN INTERNATIONAL FINANCE?

Facing the American dual deficits of out of balance trade and out of balance government expenditures, what will the next phase of international finance bring?

The two great approaching dangers are inflation in the US and a devaluation of the Dollar. Some analysts are of the view that a rise in inflation is already behind schedule not because of a lack of money supply pressures but because of the weakness of the overall economy and the great economic uncertainties and risks that prevail as results of fiscal irresponsibility (Bloom, Bond, and Van Reenen 2007, Kellogg 2010, Mackenzie 2012).

Both the velocity of money and the rate of investments are below normal, with individuals as well as corporations hoarding cash and cash equivalents rather than making investments or even increasing expenditures as they await constructive actions from the Administration and regulatory organizations.

In their report to Reuters on Dec 18, 2012 entitled “HOLDING BACK”, Lange and Spicer report:

*...researchers at Stanford University and the University of Chicago have created an index to gauge just how murky the future looks.*

*They count soon-to-expire tax provisions and mentions of uncertainty in major newspapers, as well as how much economic forecasters disagree on things like future government spending.*

*In a sample period between 1985 and 2011, they found heightened uncertainty went hand in hand with weak economic growth and hiring. Their index hit an all-time high last year when congressional gridlock nearly led the United States to default on its debt. It remains high, with a host of temporary tax cuts due to expire at year's end and the debate over the fiscal cliff regularly splashed across front pages.*

*Nicholas Bloom, a Stanford economist who helped make the uncertainty index, says weak levels of investment, along with surveys in which businesses say they are holding back because of concerns over the direction of policy, suggest uncertainty has weighed on growth since late 2011.*

*This year, business investment on capital goods - things like equipment and machinery - has fallen short of what economists would expect considering the \$1.7 trillion in cash that companies were holding in the third quarter.” (Lange and Spicer, 2012)*

Both of these entities, the Administration and regulators, are pursuing actions that deter rather than encourage growth oriented measures by the private sector.

*US House of Representatives member Congressman Darrell Issa asked 150 industry groups which of President Obama's regulations they think are impeding economic growth. From more than 100 different new regulations either proposed or finalized by the Obama administration, these are the five business groups hate the most, based on the number of separate organizations that wrote Issa to recommend he look into them:*

1. *Environmental Protection Agency's (EPA) climate change regulations*
2. *Occupational Safety and Health Administration's (OSHA) "occupational noise" regulation*
3. *EPA's new restrictions on ozone pollution*
4. *Implementation of the Dodd-Frank financial reform bill*
5. *EPA's new training requirements for renovation projects* (Strong, 2011)

## **THE ENVIRONMENTAL PROTECTION AGENCY AND INTERFERENCE WITH JOB CREATION**

The Environmental Protection Agency's (EPA) finding that carbon dioxide endangers public health--a finding based on the somewhat flawed science of the UN's Intergovernmental Panel on Climate Change--set in motion a raft of burdensome regulations that are stifling job creation, new construction, and technological innovation. Senator Inhofe has introduced the Energy Tax Prevention Act of 2011 to remove EPA's authority to regulate carbon dioxide and to stop the EPA from raising prices for electricity and gasoline (US Senate Committee on Environment and Public Works, 12/14/12).

At the same time, the enormously increased fiscal disbursements which constitute a large portion of the federal government's deficits have proven to be quite ineffective in stimulating GDP growth. The deficit expenditures to a significant degree constitute consumption, funded by borrowed money, a process that detracts from the economy's future potentials and is a manifestation of the destruction of present and future capital resources.

Will all this profligacy lead not only to inflation but also to a further devaluation of the Dollar? Probably yes, because inflation means a reduction in purchasing power; therefore, countries that are experiencing lower or significantly lower rates of inflation could want to or would allow their currencies to appreciate against the Dollar.

Relative exchange rate fluctuations and exchange rate volatility are subject to a variety of pressures as well as to manipulative interactions. Nonetheless, in 2010-2013, when the Euro's stability and even survival were in question, why was it that instead of the Euro's value falling significantly against the Dollar, the exchange rate between the two currencies continued and continues to hover around \$1.3 per Euro. Is this not an indication that the Dollar is weakening together with its brother reserve currency -- the Euro?

When asked about this possibility, the President of the New York Fed responded by correctly pointing out the fact that the Federal Reserve Board's two principle responsibilities are the avoidance of harmful rates of inflation and the fostering of full employment while the Fed has no responsibility to support the exchange value of the Dollar.

One way to interpret this statement is that the President simply avoided the question. Another way is to recall that over the years several Chairmen of the Fed, when asked, usually state that they are in support of a strong and stable Dollar. Yet often, simultaneously, they take actions that are likely to exert downward pressures on the value of the Dollar. This is an outcome favored by exporters but is harmful to holders of Dollar denominated financial assets especially if they are not citizens or residents of the US or if they are the governments and Central Banks of other nations.

It is then reasonable to conclude that even without positive actions by the Central Bank of China, over time, a strengthening of the Renminbi is likely to continue. In the next few years, the Renminbi is likely to acquire more acceptability, become more readily convertible and move toward becoming one of the reserve currencies.

# THE DOLLAR ADVANTAGE

The Dollar and its exchange value are manifestations of the political economic position of the United States. Similarly, the Renminbi, its convertibility and its exchange value are manifestations of the political economic position of the People's Republic of China.

A strong dollar reflects a strong America. Historically, a strong, fully acceptable Dollar gave America a wonderful advantage. America could import whatever it wanted and pay for imports with paper money without the requirement of first generating hard currency funds from export revenues. Many other countries' currencies are readily accepted in settling payment obligations, but only a limited number of currencies are held in large quantities by the central banks or treasuries of many countries under the designation "reserve currency".

Conversely, until recently, China had to earn hard currency from exportation so it could pay for the imports it needed or wanted from foreign sources.

In the coming years, the exchange value of the Dollar may decline further due to measures being taken by the US government and the Federal Reserve Bank. The Renminbi may rise automatically if the Dollar's value declines.

It is not completely clear that America's losses are simultaneously gains for China. Finance is not a zero-sum game. Yet the proportions of the benefits can be reallocated among the participants in financial transactions. If the US Governmental and Federal Reserve Bank actions harm the Dollar, thus weakening America and strengthening the PRC, who are the friends of the US and who are the friends of the PRC? (Liu et al, 2011)

No answer to this question is offered here.

## THE DOLLAR: EXORBITANT OR EARNED PRIVILEGE? THE DOLLAR: THE TRAP OR THE HAVEN?

Both Eichengreen's and Prasad's works are critical of the special advantages that accrued to the United States from its control of the world's supreme reserve currency. Their works would anticipate a decline or fall in the relative importance of the Dollar in the world economy. Yet, both of them conclude or at least observe that when the global financial crisis and the great recession arose, to a significant degree from improper or failing actions by United States' authorities and financial organizations, the role of the Dollar and the world's reliance on the Dollar increased rather than declined.

This only partially anticipated outcome may be the result of the fact that the *privilege* is not an *exorbitant* one, but one that was *earned* and is *deserved*.

There is a need to differentiate between *exorbitant* privilege versus *well-earned* privilege. The reserve currency status of the US Dollar is based on nearly 250 years of reliability in terms of honoring national financial debt obligations to both domestic and foreign lenders. It was *earned* through gradual and somewhat continuous economic growth, exploration, territorial expansion, defensive wars, victorious military alliances, enormous economic sacrifices and generosity, the willingness to fight against tyranny and a willingness to die for others (Gordon, 2004).

Most significantly, and here it is important to agree with the two authors, the US government and the American people may not have been and are not sufficiently appreciative of the greatness of this advantage. Maybe the US has not viewed the advantage to a sufficient degree as a privilege. As a result, the US has allowed its position as a guardian of world financial stability to erode not by attempting to prevent the rise of

the economies and finances of other, sometimes competing nations but rather through taking less than financially responsible actions which either caused stagnation or a weakening in the US economy, both in the short and the long run.

The reserve currency status provided huge advantage to the United States. But to emphasize further, it was earned through many decades of hard work, much suffering, compromise of national identity and culture, phenomenal quantities of taxes paid and, extremely importantly, an approximately 75% devaluation of the US Dollar against the other reserve currencies and a greater than 90% devaluation of the US Dollar against gold. The advantages have been and continue to be associated with great costs (Engel, 2008).

The progress of the Renminbi toward reserve currency status can be a positive for the world economy if China uses its improved currency constructively rather than as an instrument of mercantilism or imperialism.

The position of the US Dollar in the world economy is that of an earned privilege and the Dollar remains a haven for the economies of the world.

## **IMPLICATIONS AND CONCLUSIONS**

The above discussed developments and trends have major implications for the world of global finance, but these implications may lead to considerably different lessons to be learned by individual nations facing specific economic and financial challenges.

Among the many countries going through financial crisis, significantly different phenomena are experienced by countries such as the US, China, Japan, and Greece. The reason for referring specifically to these four countries is that the first two are the principal subject matter of this paper and the second two are examples of almost opposite approaches to resolving the respective nation's financial and economic challenges.

Japan and Greece face near crisis level challenges. Japan has gone through twenty years of economic stagnation, though fortunately for its people, at high GDP and per capita income levels. Greece is in an economic and financial crisis of depression-like magnitudes, with nearly a 25% decline in its GDP accompanied with corresponding declines in per capital income, and aggravated by unemployment rates nearly unprecedented in the post-World War II period (Matsagnis, and Leventi, 2011).

Japan attempted to emerge from stagnation using a combination of a monetary policy of near zero interest rates and a policy of enormous fiscal stimuli through radical increases in the national debt with the newly borrowed funds spent on a wide variety of governmental projects (Tylers, 2012).

Greece, on the other hand, is subject to monetary developments of very high interest rates necessitated by its very low standing in international and also in domestic financial markets combined with an aggressive austerity policy of cutbacks in government projects, programs, and benefits.

The strategy alternatives then are focused on low versus high interest rates and strong fiscal stimuli versus austerity policies. How do these alternatives apply to the United States and its ability to maintain the high level of respectability that causes other nations to use the Dollar as their principal reserve currency?

In the great recession, the United States is experiencing multi-trillion dollar reductions in the Nation's total inventory of assets, significant rises in unemployment and a very slow rate of recovery that are bringing it back to pre-great recession levels only after six years, despite enormous monetary stimuli and the incurring of enormous fiscal debts.

China is also experiencing an economic slowdown due to the indirect impacts of the global recession, but it has not suffered the kind of declines in the values of its assets experienced even by the United States. On the other hand, China is facing the challenge of at least partially re-staging its economy with somewhat

decreased emphases on infrastructure investments and on production for exportation in favor of increases in domestic consumption (Gorrie 2013).

What are then the lessons to be learned for the US and China?

First, it is to be observed that the Japanese experience indicates what does not work:

- a) twenty years of ineffective expenditures on dubious public works in the guise of fiscal stimuli,
- b) many years with near zero interest rates in the guise of monetary stimuli that failed to bring about significantly increased quantities of productive investments.

Second, it is also to be observed that the Greek experience identifies a road to fiscal disaster:

- a) big increases in the Nation's debt to domestic and foreign lenders,
- b) misstating of financial performance and asset positions,
- c) widespread tax avoidance and tax evasion,
- d) ineffective use of government funds .

Third, the United States should observe further that following Japanese and Greek monetary and fiscal policies and practices is likely to be very harmful:

As the fiscal crisis peaked in 2008 to 2009, some effective fiscal and monetary measures were taken in the United States, bringing about the *recovery-spring* of 2010 that consisted of a resumption of economic growth and the unblocking of lending processes by the banking system. These were major accomplishments.

However, since mid-2010, neither the fiscal stimuli in the form of deficit spending nor the monetary policies of near zero percent interest rates nor measures of injection of funds through Federal Reserve actions have been very effective in reviving vigorous economic growth rates. There has been excessive reliance on monetary measures to revive the economy, without corresponding complements of creating business environments and regulatory frameworks favorable to business investments and increased hiring and re-hiring of employees. In face of an uncertain environment, risk reduction superseded the drive for growth (Gordon, 2014).

Fourth, for China, the country that was less damaged by the great recession but still is very much in need of fostering economic growth, the principle observation that may be drawn is that neither for fiscal policy nor for monetary policy are United States practices and experiences good guides for China to follow. Therefore, for the time being, China should not look to the United States for guidance for political-economic strategies and tactics to pursue.

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# THE MARKETABILITY DISCOUNT AND ITS IMPACT ON INITIAL PUBLIC OFFERING UNDERPRICING AND PRICE ADJUSTMENT

*Juan M. Dempere, Ramon Griffin and Paul Camp*

## ABSTRACT

*The main goal of this article is to provide statistical evidence about the impact of the marketability discount on Initial Public Offering (IPO) underpricing and price adjustment. Our results suggest that the marketability discount has a positive and significant relationship with the level of IPO underpricing and the price adjustment. Similarly, our results suggest that the period of time between the IPO date and the last pre-IPO transaction date is negatively related with both the level of IPO underpricing and the price adjustment. We also find evidence that the marketability discount declines with the number of pre-IPO transactions and changes over time.*

Key words: IPOs, underpricing, marketability, discount, liquidity

## INTRODUCTION

The marketability of an asset refers to the chances that said asset will be converted into cash without significant transaction costs. The marketability discount is the downward correction to the value of that asset to reflect the difficulty of converting it into cash. The marketability discount on the price of an asset will be equivalent to the transaction costs of converting that asset into cash. If the asset cannot be converted into cash quickly, investors will have to bear an opportunity cost for a period of time. The longer the period of time, the higher the opportunity cost, and the greater the marketability discount required for selling the asset. Several factors may explain the marketability discount. An asset will be more or less marketable depending on how difficult it is to be valued. Similarly, the more uncertain the value of an asset, the higher its lack of marketability, and the greater the marketability discount required to convert it into cash.

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Several methodologies have been applied to study the marketability discount. One of them involves comparing the price of an asset during a period when the asset is marketable versus a period when the asset is not marketable. In the particular case of IPOs, pre-IPO studies involve the comparison of the price of a firm's stock share while it was still private versus the final IPO price. This is the methodology we apply in our research work; we measure the impact of the marketability discount on IPO underpricing and price adjustment.

During a typical IPO process, the offer price is determined by the firm's valuation divided by the number of shares expected to be outstanding after the IPO. The determination of a firm's value is a complex process that involves selecting comparable firms. The lead investment bank or underwriter is responsible for this valuation process which involves input from potential investors. During the road show, the lead underwriter contacts potential investors to promote the IPO and to learn about their interest on the new public firm. Since the first IPO filing with the Securities and Exchange Commission (SEC) usually does not include the final IPO price, investors must estimate an attractive price for them to be willing to participate. The information is recorded into order books and then it is incorporated into the IPO valuation process.

One of the main reasons for a firm to go public is to raise equity capital for investment purposes. However, firms going public usually sacrifice sizable dollar amounts often referred to as "money left on the table" resulting from the IPO underprice. This means that the closing price of the first trading day of the new public firm is usually higher than the IPO offer price. We consider that the pricing process of an IPO may be explained by the marketability discount and some related variables. To the extent of our knowledge, there is no previous academic work that relates underpricing and price adjustment with the marketability discount. Our results suggest that the marketability discount has a positive and significant relationship with the level of IPO underpricing and price adjustment. We find that the average period of time between the IPO date and the last pre-IPO transaction date is negatively related to both the level of IPO underpricing and the level of price adjustment. The number of pre-IPO transactions has no significant impact on the level of underpricing and price adjustment. We also find evidence that the marketability discount changes over time and declines with the number of pre-IPO transactions.

The rest of this paper is organized as follows: section 1 summarizes the relevant literature review on this topic; section 2 explains our proposed hypotheses; section 3 describes our methodology and proposed models; section 4 explains our sample and provides some summary statistics; section 5 provides details of our empirical results; section 6 summarizes major conclusions about our research work; and the last section lists the bibliographic references cited in this article.

## **LITERATURE REVIEW**

We could not find previous academic literature that relates the marketability discount with IPO underpricing and price adjustment. However, we have considered that some articles about restricted stock studies and pre-IPO offerings are relevant to our research work for comparison purposes. Wruck (1989) argues that unregistered stocks have more resale restrictions compared to registered ones, and therefore the former are expected to include a marketability discount from the open market price, while the latter are expected to be offered at a price closer to the open market price. He finds that unregistered sales are offered at 86.5 percent of the market price one day before the sale announcement and registered sales are offered at 104 percent of the same open market price. Silber (1991) finds that firms sell restricted stocks at an average price discount of 33.75 percent as a mechanism to compensate investors for the relative lack of marketability of these stocks. He also finds that this marketability discount is inversely related to the firms' revenues and earnings. Hertz and Smith (1993) study market discounts on 106 private equity placements from 1980 to 1987 and their stock price reaction. They find an average discount on private placements of about 13 percent, although they find a higher discount of 13.5 percent for placement of restricted shares which is higher than that for registered stocks. Bajaj et al. (2001) study 88 private placements from 1990-97 and find an average marketability discount of 9.85 percent for registered stocks versus 28.13 percent for restricted stocks. Officer (2007) studies the factors that explain multiples paid to acquire unlisted targets. She finds that unlisted targets are sold at an average discount of 15 to 30 percent relative to her control sample of public targets.

Also relevant to this article are those previous academic works where the marketability discount is measured as the percentage difference between the IPO offer price and the price of pre-IPO transactions involving the same shares of stock. Block (2007) studies 91 public and private firms from 1999 to 2006. He finds an average marketability discount of 20 to 25 percent. Damodaran (2005) summarizes the major findings of previous research works using this IPO approach, and he cites the works of John Emory and the works of Willamette Management Associates. Since we do not have access to these articles, we provide these two references from this secondary bibliographic source. The work of John Emory compares the IPO offer price with the price of private stock transactions within the first five months prior the IPO date; while the work of Willamette Management Associates does the same analysis but looking at transactions three year prior to the IPO date and adjusted for changes in the PE ratio. Emory's results present an average marketability discount of about 45 percent and this result is consistent from 1985 to 1997. Willamette Management Associates' results present an average marketability discount ranging from 32 to 75 percent. Finally, Pratt (2002) states that the broadest pre-IPO study was developed by Valuation Advisors in 2000, called the Valuation Advisors Lack of Marketability Discount Study<sup>TM</sup>. In this study they recorded all transactions that took place before the IPO date. The study finds that the average marketability discount changes with the period of time between the pre-IPO transaction date and the IPO date. Indeed, the study reports that the average marketability discount for transactions that occurs 90 days before the IPO date is 31.50 percent, while the same average discount jumps to 71.61 percent if the pre IPO transaction occurred at least one year before the IPO date.

Chen and Xiong (2001) study the marketability discount (illiquidity or non-marketability as they call it) of several types of shares of Chinese companies. Specifically, they compared common shares traded on stock exchanges and restricted institutional shares (RIS) non tradable and only transferable privately or through irregular scheduled auctions. They find an average discount of 77.93 percent for auction transferable RIS and 85.97 percent for private transferable RIS relative to their common shares counterpart. Wang and Jiang (2003) study Chinese companies that issue both H-share stocks in Hong Kong and A-share stocks on either the Shanghai Stock Exchange (SHSE) or the Shenzhen Stock Exchange (SZSE). They find that the average daily price discount of H-shares relative to A-shares is 75.7 percent.

## PROPOSED HYPOTHESES

As we mentioned above, one of the most complex tasks of an IPO process is determining the firm value and a stock price that may be considered attractive to potential investors. The information about potential interest in an IPO gathered by the lead underwriter affects the offer price decision process. However, the difficulty in appraising a firm's value may also discourage investors to disclose information that can be factor effectively in its IPO offer price. Therefore, when the company is unique with few or no relevant benchmarks to compare with, the uncertainty about the true value of the firm increases. In these circumstances, stock transactions usually have associated high levels of marketability discount which can be considered as a proxy measure of the level of uncertainty about the fair value of the firm and also the degree of difficulty to appraise such fair value. In addition, the more unique and difficult the company is for valuation purposes, the fewer substitutes exist in the market from an investor perspective. This lack of close substitutes for a firm in the market makes the company illiquid and this explains why large marketability discounts are required when a private transaction takes place. Therefore we hypothesize that: (H1) *the level of IPO underpricing is positively related to the marketability discount*. The rationale for this hypothesis is that the marketability discount is a proxy to measure of how difficult it is to value a company. If the company is extremely unique, with just a few relevant benchmarks to compare with and with a few substitutes in the market, the marketability discount would be high. In cases like this, potential investors would not be able to reveal much information to the lead underwriter, and this lack of info may be interpreted as lack of interest from potential investors. As a result, the lead underwriter would factor this into the IPO offer price decision-making process. Consequently, the offer price may be extremely low compared to the fair market price, increasing the level of underpricing.

We also evaluate the impact of the time between the IPO date and the last pre-IPO transaction date. We believe that the longer this period of time, the lower the impact of the marketability discount in the level of

IPO underpricing, and vice-versa. In other words, we hypothesize that: (H2) *the period of time between the IPO date and the last pre-IPO transaction date is negatively related to the level of underpricing*. The rationale for this hypothesis is that holding all other relevant factors constant, the impact of the marketability discount on the level of IPO underpricing is higher when the last pre-IPO transaction happens close to the IPO date, and it is lower when such a transaction occurred a long time before that IPO date. In other words, we believe that the magnitude of the positive relationship hypothesized in H1 is negatively related with the period of time between the IPO date and the last pre-IPO transaction date.

The next variable evaluated in this article is the number of pre-IPO transactions within two years before the IPO date involving common stocks, common stock options, and convertible preferred stocks. We consider that the more pre-IPO transactions occur two years before the IPO date, the lower the impact of the marketability discount in the level of IPO underpricing, and vice-versa. In other words, we hypothesize that: (H3) *the number of pre-IPO transactions happening two years before the IPO date is negatively related with the level of underpricing*. The rationale for this hypothesis is that the larger the number of pre-IPO transactions, the lower the uncertainty about the fair price at which investors are willing to pay for the stock share, and the marketability discount at which these shares are traded becomes less relevant. In other words, many pre-IPO transactions provides more information about what investors are willing to pay for the share of stock, which in turn allows the lead underwriter to set an offer price closer to what the market perceives as a fair price, and therefore the level of underpricing would be lower.

Another dependent variable considered in this article is the level of price adjustment measured twice. First, we determine the absolute value of the difference between the IPO offer price and the middle point of its filing range. Second, we determine the percentage deviation of the IPO offer price from the middle point of its filing range. Hanley (1993) finds that when issuers have positive price adjustment of the offer price compared to the middle point of the filing range in the preliminary prospectus, the level of underpricing and the number of shares issued increases, and he hypothesizes that this occurs because of favorable information gathered during the pre-IPO period. Goergen, Khurshed, and Renneboog (2009) study the reasons for the large difference in underpricing between the German and French Euro New Markets. They find that IPOs are highly underpriced in these two markets if they are risky and if the offer price is revised upwards. We also analyze the relationship between the marketability discount and the level of price adjustment, and we hypothesize that: (H4) *the marketability discount is positively related to the level of price adjustment*. The rationale for this hypothesis is that we consider the marketability discount to be a valid proxy to measure the uniqueness of the firm and the uncertainty about the appraisal of its fair market value. Therefore, when a firm exhibits a high marketability discount, the lead underwriter has to rely more on investor-related information when pricing the IPO rather than in benchmark-related information to determine an attractive IPO offer price. This is partially explained by the fact that the higher the marketability discount, the more unique the firm is, and the less benchmarks exist for valuation purposes. In other words, the higher the marketability discount, the greater the uncertainty about the value of the firm, and the larger the price adjustment due to the vast value-related uncertainty associated with the firm.

We also analyze the relationship between the level of price adjustment and the time between the IPO date and the last pre-IPO transaction date. As we mentioned above, in this case we also consider that the longer this period of time, the lower the impact of the marketability discount in the level of price adjustment, and vice-versa. In other words, we hypothesize that: (H5) *the period of time between the IPO and the last pre-IPO transaction date is negatively related with the level of price adjustment*. Like in hypothesis H2, the rationale here is that keeping all other variables constant, the influence of the marketability discount in the level of price adjustment is higher or lower when the last pre-IPO transactions takes place closer to or farther from the IPO date respectively. In other words, the magnitude of the positive relationship hypothesized in H4 is negatively related with the period of time between the IPO date and the last pre-IPO transaction date.

Finally, we evaluate the relationship between the level of price adjustment and the number of pre-IPO transactions within two years before the IPO date involving the common stocks, common stock options, and convertible preferred stocks. Similarly to our rationale for hypothesis H3 above, here we consider that the more pre-IPO transactions happening within two years before the IPO date, the lower the uncertainty surrounding the price investors might be willing to pay for the share of stock, and the lower the level of price adjustment, and vice-versa. In other words, we hypothesize that: (H6) *the number of pre-IPO transactions occurring within two*

years before the IPO date is negatively related to the level of price adjustment. The rationale for this hypothesis is that the larger the number of pre-IPO transactions, the greater the number of valid references that the lead underwriter could collect about the share price investors might be willing to pay for the share of stock. Therefore, the price adjustment would probably be less severe when there are many pre-IPO transactions than when there is none of them.

## METHODOLOGY

The level of IPO underpricing ( $UP_i$ ) is measured by the 1-day holding period return for IPO  $i$ , as  $(P_1 - P_0)/P_0$ , where  $P_0$  is the offer price and  $P_1$  is the first-day closing price. The level of underpricing is determined for each firm in our sample of IPOs. We also use the difference-in-mean test to analyze differences in the marketability discount in our sample. The cross-sectional variations of the level of underpricing ( $UP_i$ ) are determined by the following ordinary least square (OLS) regression model:

$$UP_i = a_1 + b_1MD_i + b_2LnPre_i + b_3NTrans_i + b_4UR_i + b_5LnD_i + b_6NASDAQ_i + b_7PA_i + b_8PreOwn_i + b_9LnAssets_i + b_{10}Bubble_i + e_i$$

where  $a_1$  is the intercept term in the model; the variable  $MD_i$  is the marketability discount for IPO  $i$  measured as  $(OP - Pre-P)/OP$ , where  $OP$  is the IPO offer price and  $Pre-P$  is the price of the last pre-IPO transaction involving the firm's common stocks, common stock options, and convertible preferred stocks;  $LnPre_i$  is the natural logarithm of the number of days between the pre-IPO transaction date and the offer date of IPO  $i$ ;  $NTrans_i$  is the number of pre-IPO transactions within two years before the IPO  $i$ 's date involving its common stocks, common stock options, and convertible preferred stocks. The control variables include the following:  $UR_i$  is the IPO's underwriter reputation measured by the adjusted Carter-Manaster rankings from Jay Ritter's website at <http://bear.cba.ufl.edu/ritter/rank.htm> (see Carter and Manaster, 1990);  $LnD_i$  is the natural logarithm of the number of days between the filing date and the offer date;  $NASDAQ_i$  is the percentage change in the NASDAQ Composite Index between the filling date and the offer date;  $PA_i$  is the level of price adjustment measured as the percentage deviation of the IPO offer price from the middle point of its filing range;  $PreOwn_i$  is the percentage of shares of stock outstanding retained by pre-IPO shareholders;  $LnAssets_i$  is the size of IPO  $i$  measured as the natural logarithm of the total assets of the firm reported before the offer date;  $Bubble_i$  is a dummy variable that takes the value of one if IPO  $i$  occurs in 1999 or 2000, and zero otherwise; and finally,  $e_i$  is the error term.

In order to evaluate hypotheses H4-H6 we use the level of price adjustment ( $PA_i$ ) measured first as the absolute value of the difference between the IPO offer price and the middle point of its filing range, and second, as the percentage deviation of the IPO offer price from the middle point of its filing range. This our second dependent variable evaluated using the previous OLS model. We drop this variable from the original model as the independent variable, and the model we use is the following:

$$PA_i = a_1 + b_1MD_i + b_2LnPre_i + b_3NTrans_i + b_4UR_i + b_5LnD_i + b_6NASDAQ_i + b_7PreOwn_i + b_8LnAssets_i + b_9Bubble_i + e_i$$

where all variables at the right side of the equation are the same as those described above.

## SAMPLE AND SUMMARY STATISTICS

Our sample consists of 1,171 IPOs offered between 1998 and 2008. The marketability discount is obtained from the Valuation Advisors' Lack of Marketability Discount Study developed by Brian Pearson of Valuation Advisors, LLC (VAL, <http://www.bvmarketdata.com/defaulttextonly.asp?f=VALMD%20Intro>). This study compares the IPO offer price with the price of pre-IPO transactions involving the firm's common stock, common stock options and convertible preferred stocks. These pre-IPO transactions are used to determine the

marketability discount since they took place when the firm was private with illiquid common stocks since no market existed for them. The sample excludes Real Estate Investment Trust (REIT) IPOs, firms with convertible preferred stock or options prior to the IPO, Master Limited Partnerships (MLP), Limited Partnerships (LP), close end funds, mutual conversions; American Depositary Receipts (ADRs) and U.S. firms with business primarily in foreign countries. The pre-IPO transactions considered are those within two years before the IPO date. The IPO-related data is obtained from Securities Data Corporation's (SDC) Global New Issues database. The firms in our sample have stock price data available at the Center for Research in Security Prices (CRSP). The first day closing prices for the IPO are obtained from CRSP. Those IPOs without price data at CRSP are eliminated. We exclude IPOs of American Depositary Receipts (ADRs), enhanced income securities, stocks with warrants, income depositary shares, and unit IPOs. Data for our control variables are retrieved from the Securities and Exchange Commission (SEC) filings at the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) database; specifically from the IPO's initial prospectus and proxy statements. Accounting data are obtained from Standard and Poor's Research Insight database.

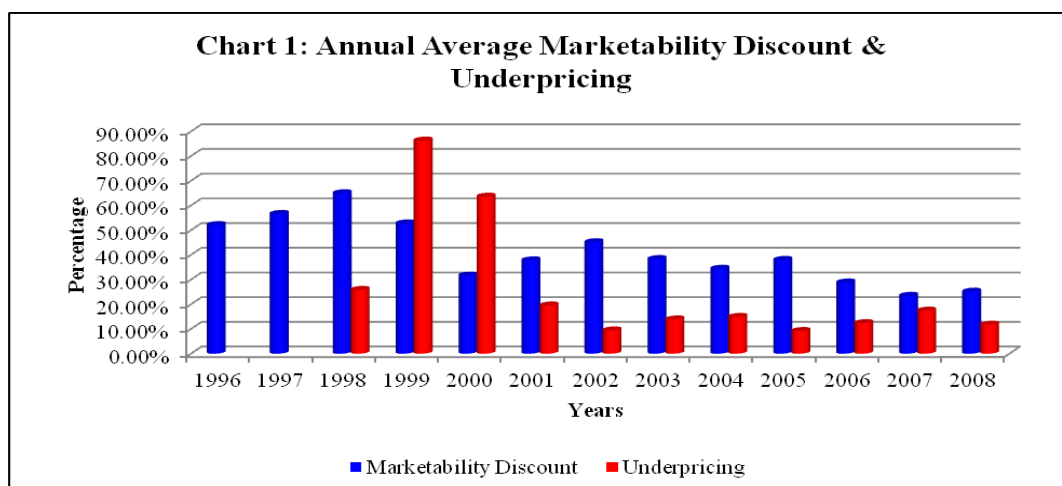
Table 1 and chart 1 shows the average marketability discount and average underpricing per year. The average marketability discount seems to exhibit a declining trend starting in 1998. The level of underpricing exhibits a dramatic increase in 1999 and 2000 due to the so-called "internet bubble" and after that declines with a slight increase in 2007 (17.35%)

**Table 1.** The average marketability discount and average underpricing per year

Year	N	Marketability Discount	N	Underpricing
1996	245	52.07%	-	-
1997	231	56.59%	-	-
1998	471	64.99%	108	27.45%
1999	684	52.74%	297	85.34%
2000	287	31.63%	229	63.02%
2001	78	37.81%	47	19.82%
2002	107	45.14%	34	9.91%
2003	239	38.32%	48	13.63%
2004	313	34.39%	108	15.70%
2005	291	37.99%	106	11.04%
2006	339	28.84%	92	13.51%
2007	146	23.44%	98	17.35%
2008	126	25.11%	4	10.71%

*Notes:* The Since our sample includes pre-IPO transactions within two years before the IPO offer date, the data for marketability discount starts in 1996. Also, we include all pre-IPO transactions for each firm within those two years before the IPO offer date. This explains the difference between the total number of observations between the marketability discount and the level of underpricing.

One criticism about deriving the marketability discount from pre-IPO transactions is that participants in these transactions are often insiders who provide some kind of service to the company. Therefore, a portion of the marketability discount might reflect a mechanism of compensation for this type of services. Although appealing, this criticism is not consistent with the marketability discounts observed in our sample. Particularly, table 2 show summary statistics about the marketability discount of each transaction per firm. Table 2 shows that the first pre-IPO transaction for our full sample has an average marketability discount of 55.57 percent; the second 42.97 percent; the third 34.12 percent; the fourth 29.31 percent; the fifth 19.64 percent; and the 6<sup>th</sup> and beyond 3.6 percent. To provide more robust results, we removed cases with less than 5 pre-IPO transactions (table 3), cases with less than 4 pre-IPO transactions (table 4), and finally cases with less than 3 pre-IPO transactions (table 5). Tables 2-5 show that the marketability discount decreases with each pre-IPO transaction regardless of the selected subsample.



**Table 2.** The first pre-IPO transaction for our full sample

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Dev.
1 <sup>st</sup> pre-IPO transaction	1171	-752.20%	99.38%	55.47%	0.42384589
2 <sup>nd</sup> pre-IPO transaction	846	-811.20%	99.06%	42.97%	0.463318087
3 <sup>rd</sup> pre-IPO transaction	483	-184.33%	94.54%	34.12%	0.342618455
4 <sup>th</sup> pre-IPO transaction	216	-76.83%	87.23%	29.31%	0.3112712
5 <sup>th</sup> pre-IPO transaction	86	-120.67%	90.24%	19.64%	0.349408223
6 <sup>th</sup> and beyond	30	-200.00%	87.04%	3.60%	0.527210083

**Table 3.** Cases with less than 5 pre-IPO transactions

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Dev.
1 <sup>st</sup> pre-IPO transaction	86	-11.00%	98.21%	66.86%	0.245662851
2 <sup>nd</sup> pre-IPO transaction	86	-71.25%	97.15%	56.63%	0.313918012
3 <sup>rd</sup> pre-IPO transaction	86	-184.33%	94.54%	44.84%	0.434080736
4 <sup>th</sup> pre-IPO transaction	86	-76.83%	87.23%	35.06%	0.350212543
5 <sup>th</sup> pre-IPO transaction	86	-120.67%	90.24%	19.64%	0.349408223

**Table 4.** Cases with less than 4 pre-IPO transactions

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Dev.
1 <sup>st</sup> pre-IPO transaction	216	-50.00%	99.22%	65.73%	0.277289747
2 <sup>nd</sup> pre-IPO transaction	216	-71.25%	99.06%	57.01%	0.29742408
3 <sup>rd</sup> pre-IPO transaction	216	-184.33%	94.54%	44.78%	0.354728535
4 <sup>th</sup> pre-IPO transaction	216	-76.83%	87.23%	29.31%	0.3112712

**Table 5.** Cases with less than 3 pre-IPO transactions

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Dev.
1 <sup>st</sup> pre-IPO transaction	483	-280.56%	99.35%	65.43%	0.32102776
2 <sup>nd</sup> pre-IPO transaction	483	-171.67%	99.06%	53.48%	0.315966398
3 <sup>rd</sup> pre-IPO transaction	483	-184.33%	94.54%	34.12%	0.342618455

Chart 2 shows these results graphically and illustrates the fact that the marketability discount decreases with the number of pre-IPO transactions. In other words, the marketability discount decreases with each transaction. If the criticism about participants in pre-IPO transactions receiving some sort of compensation that is partially reflected in the marketability discount is true, then the declining average would imply that the value of such services also declines over time. This last interpretation makes no sense, so our results suggest that no compensation concession is incorporated in the marketability discount.

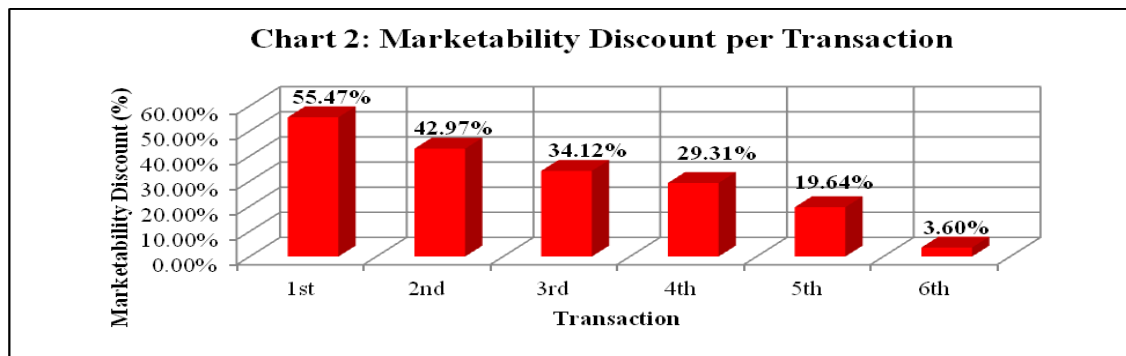


Table 6 shows the independent sample tests of the average marketability discount per transaction. The average marketability discount declines with each pre-IPO transaction and all these results are statistically significant at conventional levels of confidence. Again, if the marketability discount includes some kind of compensation for those involved in the transaction, either the value of the corresponding provided service declines with the number of transactions or simply the marketability discount reflected by pre-IPO transaction does not include any type of compensation. We consider that this last alternative is the correct interpretation.

**Table 6.** The independent sample tests of the average marketability discount per transaction

	Mean	Levene's Test	t-test for Equality of Means (Sig. 2-tailed)	
1 <sup>st</sup> vs. 2 <sup>nd</sup> Transaction (N: 1171 vs. 846)				
1 <sup>st</sup>	55.47%	F = 0.3719032	Equal variances assumed	t = 6.283
2 <sup>nd</sup>	42.97%	-0.542		( 0.000)****
2 <sup>nd</sup> vs. 3 <sup>rd</sup> Transaction (N: 846 vs. 483)				
2 <sup>nd</sup>	42.97%	F = 0.81755	Equal variances assumed	t = 3.667
3 <sup>rd</sup>	34.12%	-0.36606		( 0.000)****
3 <sup>rd</sup> vs. 4 <sup>th</sup> Transaction (N: 483 vs. 216)				
3 <sup>rd</sup>	34.12%	F = 2.04229	Equal variances assumed	t = 1.7612
4 <sup>th</sup>	29.31%	-0.153427		(0.0786)*
4 <sup>th</sup> vs. 5 <sup>th</sup> Transaction (N: 216 vs. 86)				
4 <sup>th</sup>	29.31%	F = 0.1989	Equal variances assumed	t = 2.353
5 <sup>th</sup>	19.64%	-0.65593		(0.0193)**
5 <sup>th</sup> vs. 6 <sup>th</sup> Transaction (N: 86 vs. 30)				
5 <sup>th</sup>	19.64%	F = 2.3239	Equal variances assumed	t = 1.881
6 <sup>th</sup>	3.60%	-0.1302		(0.0625)*

Notes: The *p*-values are shown in parentheses. \*, \*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The Levene's test for equality of variances allows us to determine whether the two transactions have about the same or different amounts of variability. When the F value has a level of significance greater than .05 (see values in parenthesis below the F vaes) then the variability in the average marketability discount per transaction is not significantly different between the two transactions and equal variances are assumed. When the F value has a level of significance lower than or equal to .05, equal variances are not assumed. When equal variances are assumed, the calculation uses pooled variances; when equal variances cannot be assumed, the calculation utilizes un-pooled variances and a correction to the degrees of freedom. The formulas are as follows: for pooled variances  $t = (\bar{X}_1 - \bar{X}_2) / S_p \sqrt{(1/n_1) + (1/n_2)}$ , where



$S_p = \sqrt{[(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2] / (n_1 + n_2 - 2)}$  and  $d_f = n_1 + n_2 - 2$ ; for un-pooled variances

$t = (\bar{X}_1 - \bar{X}_2) / \sqrt{(s_1^2/n_1) + (s_2^2/n_2)}$ , where

$d_f = [(s_1^2/n_1) + (s_2^2/n_2)]^2 / [(1/(n_1 - 1)) \times (s_1^2/n_1)^2 + (1/(n_2 - 1)) \times (s_2^2/n_2)^2]$

## EMPIRICAL RESULTS

We ranked our sample based on the marketability discount from highest to lowest IPO. Then we compare the underpricing of the first half of our sample with the highest level of marketability discount against that of the second half with the lowest level of marketability discount. We also compared the values above the upper quartile versus those below the lower quartile, above the upper quintile versus those below the lower quintile, and the values above the upper 10<sup>th</sup> percentile with those below the lower 10<sup>th</sup> percentile. Table 7 shows the independent sample tests of the average level of underpricing for each sub group described above. The average level of underpricing of the first half of our sample with the highest level of marketability discount is 57.56 percent while the second half with the lowest level of marketability discount has an average level of underpricing of 28.50 percent. Similarly, the average level of IPO underpricing above and below the upper and lower quartiles are 56.95 versus 16.83 percent, the upper and lower quintiles are 58.17 versus 15.42 percent, and the upper and lower 10<sup>th</sup> percentile are 67.33 versus 9.02 percent. All these results are statistically significant at conventional levels of confidence. These results clearly support hypothesis H1 about the level of IPO underpricing being positively related with the marketability discount. This positive relationship is clear because the group (half, quartile, quintile, or percentile) with the highest average marketability discount exhibits the highest level of IPO underpricing, and the opposite is also true regarding the group with the lowest average marketability discount.

**Table 7.** The independent sample tests of the average level of underpricing

	Mean	Levene's Test	t-test for Equality of Means (Sig. 2-tailed)	
1 <sup>st</sup> vs. 2 <sup>nd</sup> Half (N: 585 vs. 586)				
1 <sup>st</sup> half	57.56%	F = 79.212 (0.0000)****	Equal variances not assumed	t = 7.061 (0.0000)****
2 <sup>nd</sup> half	28.50%			
1 <sup>st</sup> vs. 4 <sup>th</sup> Quartile (N: 292 vs. 293)				
1 <sup>st</sup> quartile	56.95%	F = 104.23 (0.0000)****	Equal variances not assumed	t = 7.23 (0.0000)****
4 <sup>th</sup> quartile	16.83%			
1 <sup>st</sup> vs. 5 <sup>th</sup> Quintile (N: 234 vs. 235)				
1 <sup>st</sup> quintile	58.17%	F = 85.525 (0.0000)****	Equal variances not assumed	t = 6.636 (0.0000)****
5 <sup>th</sup> quintile	15.42%			
1 <sup>st</sup> vs. 10 <sup>th</sup> Percentile (N: 117 vs. 118)				
1 <sup>st</sup> percentile	67.33%	F = 65.133 (0.0000)****	Equal variances not assumed	t = 5.842 (0.0000)****
10 <sup>th</sup> percentile	9.02%			

Notes: The p-values are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

We ranked again our sample based on the marketability discount from highest to lowest as explained above. Then we compared the average level of price adjustment of the first half of our sample with the highest level of marketability discount against that of the second half with the lowest level of marketability discount. We also compared the values above the upper quartile versus those below the lower quartile, the values above the upper quintile versus those below the lower quintile, and the values above the upper 10<sup>th</sup> percentile with those below the lower 10<sup>th</sup> percentile. Table 8 shows the independent sample tests of the average price adjustment for each sub group described above.

**Table 8.** The independent sample tests of the average price adjustment

	Mean	Levene's Test	t-test for Equality of Means (Sig. 2-tailed)	
1 <sup>st</sup> vs. 2 <sup>nd</sup> Half (N: 585 vs. 586)				
1 <sup>st</sup> half	6.02%	F = 3.638	Equal variances assumed	t = 8.355
2 <sup>nd</sup> half	-0.76%	(0.057) <sup>*</sup>		(0.0000) <sup>****</sup>
1 <sup>st</sup> vs. 4 <sup>th</sup> Quartile (N: 292 vs. 293)				
1 <sup>st</sup> quartile	5.29%	F = 0.592	Equal variances not assumed	t = 9.043
4 <sup>th</sup> quartile	-5.36%	-0.4284		(0.0000) <sup>****</sup>
1 <sup>st</sup> vs. 5 <sup>th</sup> Quintile (N: 234 vs. 235)				
1 <sup>st</sup> quintile	5.41%	F = 0.018	Equal variances not assumed	t = 9.221
5 <sup>th</sup> quintile	-7.09%	-0.894		(0.0000) <sup>****</sup>
1 <sup>st</sup> vs. 10 <sup>th</sup> Percentile (N: 117 vs. 118)				
1 <sup>st</sup> percentile	6.09%	F = 2.977	Equal variances assumed	t = 9.723
10 <sup>th</sup> percentile	-10.76%	(0.086) <sup>*</sup>		(0.0000) <sup>****</sup>

Notes: The *p*-values are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The average level of price adjustment of the first half of our sample with the highest level of marketability discount is 6.02 percent while the second half with the lowest level of marketability discount has an average price adjustment of -0.76 percent. Similarly, the average price adjustment of IPOs above and below the upper and lower quartiles are 5.29 versus -5.36 percent, the upper and lower quintiles are 5.41 versus -7.09 percent, and the upper and lower 10th percentile are 6.09 versus -10.76 percent respectively. All these results are statistically significant at conventional levels of confidence. These results support hypothesis H4 about the marketability discount being positively related with the level of price adjustment. This positive relationship is clear because the group (half, quartile, quintile, or percentile) with the highest average marketability discount exhibits the highest level of price adjustment, and the opposite is also true regarding the group with the lowest average marketability discount.

We ranked our sample again based on the period of time between the IPO date and the last pre-IPO transaction date from lowest to highest. Then we compare the underpricing of the first half and above the upper quartile, quintile, and 10<sup>th</sup> percentile of our sample with the shortest period of time against that of the second half and the values below the lower quartile, quintile, and 10<sup>th</sup> percentile of our sample with the longest period of time. Table 9 shows the independent sample tests of the average underpricing for each sub group described above.

**Table 9.** The independent sample tests of the average underpricing

	Mean	Levene's Test	t-test for Equality of Means (Sig. 2-tailed)	
1 <sup>st</sup> vs. 2 <sup>nd</sup> Half (N: 585 vs. 586)				
1 <sup>st</sup> half	58.17%	F = 77.82	Equal variances not assumed	t = 7.371
2 <sup>nd</sup> half	27.89%	(0.0000)****		(0.0000)****
1 <sup>st</sup> vs. 4 <sup>th</sup> Quartile (N: 292 vs. 293)				
1 <sup>st</sup> quartile	66.81%	F = 63.082	Equal variances not assumed	t = 7.51
4 <sup>th</sup> quartile	23.46%	(0.0000)****		(0.0000)****
1 <sup>st</sup> vs. 5 <sup>th</sup> Quintile (N: 234 vs. 235)				
1 <sup>st</sup> quintile	65.94%	F = 41.084	Equal variances not assumed	t = 6.303
5 <sup>th</sup> quintile	24.74%	(0.0000)****		(0.0000)****
1 <sup>st</sup> vs. 10 <sup>th</sup> Percentile (N: 117 vs. 118)				
1 <sup>st</sup> percentile	70.17%	F = 31.0921	Equal variances not assumed	t = 5.47
10 <sup>th</sup> percentile	21.66%	(0.0000)****		(0.0000)****

Notes: The *p*-values are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The average level of underpricing of the first half of our sample with the shortest period of time between the IPO date and the last pre-IPO transaction date is 58.17 percent while the second half with the longest period of time has an average underpricing of 27.89 percent. Similarly, the average underpricing of the IPOs above and below the upper and lower quartiles are 66.81 versus 23.46 percent, the upper and lower quintiles are 65.94 versus 24.74 percent, and the upper and lower 10<sup>th</sup> percentile are 70.17 versus 21.66 percent. All these results are statistically significant at conventional levels of confidence. These results clearly support hypothesis H4 about the period of time between the IPO date and the last pre-IPO transaction date being negatively related to the level of underpricing. This negative relationship is clear because the group (half, quartile, quintile, or percentile) with the shortest period of time between the IPO date and the pre-IPO transaction date exhibits the highest level of underpricing, and the opposite is also true regarding the group with the longest period of time.

Finally, we ranked our sample again based on the period of time between the IPO date and the last pre-IPO transaction date from lowest to highest. Then we compared the first half and the values of price adjustment above the upper quartile, quintile, and 10<sup>th</sup> percentile of our sample with the shortest period of time, against the second half and the same values below the lower quartile, quintile, and 10<sup>th</sup> percentile of our sample with the longest period of time. Table 10 shows the independent sample tests of the average price adjustment for each of these sub groups.

**Table 10.** The independent sample tests of the average price adjustment

	Mean	Levene's Test	t-test for Equality of Means (Sig. 2-tailed)	
1 <sup>st</sup> vs. 2 <sup>nd</sup> Half (N: 585 vs. 586)				
1 <sup>st</sup> half	4.91%	F = 0.2368 (0.6266)	Equal variances assumed	t = 5.545 (0.0000)****
2 <sup>nd</sup> half	3.42%			
1 <sup>st</sup> vs. 4 <sup>th</sup> Quartile (N: 292 vs. 293)				
1 <sup>st</sup> quartile	5.79%	F = 1.366 (0.243)	Equal variances assumed	t = 5.894 (0.0000)****
4 <sup>th</sup> quartile	-0.60%			
1 <sup>st</sup> vs. 5 <sup>th</sup> Quintile (N: 234 vs. 235)				
1 <sup>st</sup> quintile	6.24%	F = 40.567 (0.0000)****	Equal variances not assumed	t = -4.813 (0.0000)****
5 <sup>th</sup> quintile	0.25%			
1 <sup>st</sup> vs. 10 <sup>th</sup> Percentile (N: 117 vs. 118)				
1 <sup>st</sup> percentile	6.58%	F = 0.3219 (0.571)	Equal variances not assumed	t = 4.418 (0.0000)****
10 <sup>th</sup> percentile	-0.95%			

Notes: The *p*-values are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The average level of price adjustment of the first half of our sample with the shortest period of time between the IPO date and the last pre-IPO transaction date is 4.91 percent while the second half with the longest period of time has an average price adjustment of 3.42 percent. Similarly, the average price adjustment of the IPOs above and below the upper and lower quartiles are 5.79 versus -0.60 percent, the upper and lower quintiles are 6.24 versus 0.25 percent, and the upper and lower 10<sup>th</sup> percentile are 6.58 versus -0.95 percent respectively. All these results are statistically significant at conventional levels of confidence. These results clearly support hypothesis H5 about the period of time between the IPO and the last pre-IPO transaction date being negatively related with the level of price adjustment. This negative relationship is clear because the group (half, quartile, quintile, or percentile) with the shortest period of time between the IPO date and the last pre-IPO transaction date exhibits the highest level of price adjustment, and the opposite is also true regarding the group with the longest period of time.

The results of our independent sample tests of the average level of underpricing and price adjustment per sub-samples grouped by the number of pre-IPO transactions are not statistically significant at conventional levels of confidence, so we did not report them in this article. We consider that these exceptions with significant

results constitute spurious results and that they do not represent any empirical evidence that support hypotheses H3 and H6 at all.

**Table 11.** The results of the cross-sectional variation of the level of underpricing

	Model 1	VIF	Model 2	VIF	Model 3	VIF	Model 4	VIF
Intercept	0.3376 (10.68) ****	7.32	1.09384 (9.91) ****	8.32	0.382 (8.68) ****	6.32	0.5896 (2.60) ***	7.32
The marketability discount ( $MD_i$ )	0.307 (3.42) ****	6.74	-	-	-	-	0.088 (2.054) **	8.45
Time from IPO to pre-IPO transaction. ( $LnPre_i$ )	-	-	-0.1389 (-6.48) ****	2.69	-	-	-0.037 (-1.888) *	7.43
Number of pre-IPO transactions ( $NTrans_i$ )	-	-	-	-	0.0199 (1.262)	1.47	-0.001 (-0.039)	1.33
Underwriter reputation ( $UR_i$ )	-	-	-	-	-	-	0.0287 (3.082) ***	2.34
Time between registration and IPO offer ( $LnD_i$ )	-	-	-	-	-	-	-0.117 (-4.28) ****	1.75
NASDAQ ( $NASDAQ_i$ )	-	-	-	-	-	-	0.373 (3.274) ***	1.23
Level of Price Adjustment ( $PA_i$ )	-	-	-	-	-	-	1.41 (11.45) ****	1.56
% retained by pre-IPO shareholders ( $PreOwn_i$ )	-	-	-	-	-	-	0.89 (7.012) ****	3.34
Natural Log of Total Assets ( $LnAssets_i$ )	-	-	-	-	-	-	-0.031 (-3.17) ***	1.87
Dummy variable for Internet bubble ( $Bubble_i$ )	-	-	-	-	-	-	0.285 (7.814) ****	1.65
R <sup>2</sup>	0.033740	-	0.039157	-	0.001246	-	0.335056	-
Adjusted R <sup>2</sup>	0.032913	-	0.038335	-	0.000391	-	0.329324	-
F-statistic	40.82 ****	-	47.64 ****	-	1.457997	-	58.45 ****	-
N	1171	-	1171	-	1171	-	1171	-

Notes: The t-values are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The t-statistics are computed using White (1980) covariance estimators. The t-statistics are also estimated using the Newey-West (1987) method with identical results in terms of significance, but they are not included in this article. The variance inflation factor (VIF) quantifies the severity of multicollinearity in our regression model. Assuming 10 as a cut off value (Kutner, 2004), then we can conclude that our independent variables do not have severe problems of multicollinearity.

Table 11 shows our results of the cross-sectional variation of the level of underpricing based on our first proposed regression model. The regression model is evaluated twice: with and without our selected control variables. The marketability discount ( $MD_i$ ) is positively related to the level of underpricing and this result is statistically significant at conventional levels of confidence with and without control variables. This result supports hypothesis H1 about the level of IPO underpricing being positively related with the marketability discount. Therefore, this result supports our notion that the marketability discount is a proxy measure of the difficulty in appraising a company's market value. When a firm is extremely unique and hard to value; the lead underwriter will have less information to factor in the IPO offer price, and this uncertainty will lead to an increase in the level of IPO underpricing.

Similarly, the period of time between the IPO offer date and the last pre-IPO transaction date ( $LnPre_i$ ) measured as the natural logarithm of the number of days between these two events is also statistically significant at conventional confidence levels with and without control variables. This result supports hypothesis H2 about the period of time between the IPO date and the last pre-IPO transaction date is negatively related to the amount of underpricing. In other words, this result supports our notion that the impact of the marketability discount declines when the period of time between the IPO date and the last pre-IPO transaction date increases.

Finally, the coefficient of the number of pre-IPO transactions is not significant at conventional confidence levels with and without control variables. This result does not allow us to provide statistical support for hypothesis H3. However, all our control variables are also significant at conventional levels of confidence and these results are consistent with previous academic articles. Indeed, the negative and significant coefficient of the natural logarithm of the total assets ( $LnAssets_i$ ) and the number of days between the filing date and the offer date ( $LnD_i$ ); as well as the positive and significant results for the internet bubble dummy variable ( $Bubble_i$ ), the percentage change in the NASDAQ Composite Index between the filling date and the offer date ( $NASDAQ_i$ ), the level of price adjustment ( $PA_i$ ), and the percentage of shares of stock outstanding retained by pre-IPO shareholders ( $PreOwn_i$ ); are all consistent with previous academic studies (see Barondes 2005; Dempere 2009a and 2009b; Loughran and Ritter, 2004; Bradley and Jordan 2002; and Hanley, 1993).

**Table 12.** The results for the cross-sectional variation of the level of price adjustment

	Model 1	VIF	Model 2	VIF	Model 3	VIF	Model 4	VIF
Intercept	0.0006 (0.067)	8.45	0.126 (6.8)****	9.56	0.018 (1.96)*	5.43	-0.02 (-0.288)	7.95
The marketability discount ( $MD_i$ )	0.085 (3.24)***	7.56	-	-	-	-	0.077 (2.733)***	8.42
Time between IPO and pre-IPO transaction ( $LnPre_i$ )	-	-	-0.02 (-5.5)****	3.76	-	-	-0.016 (-3.4)****	8.96
Number of pre-IPO transactions ( $NTrans_i$ )	-	-	-	-	0.003 (1.029)	4.23	0.0029 (0.836)	1.45
Underwriter reputation ( $UR_i$ )	-	-	-	-	-	-	0.01 (3.39)****	3.65
Time between registration and IPO offer ( $LnD_i$ )	-	-	-	-	-	-	0.0002 (0.017)	1.48
NASDAQ ( $NASDAQ_i$ )	-	-	-	-	-	-	0.135 (4.68)****	1.85
% retained by pre-IPO shareholders ( $PreOwn_i$ )	-	-	-	-	-	-	0.06 (1.76)*	5.76
Natural Log of Total Assets ( $LnAssets_i$ )	-	-	-	-	-	-	-0.003 (-1.342)	1.25
Dummy variable for Internet bubble ( $Bubble_i$ )	-	-	-	-	-	-	0.029371 (2.84)***	1.84
R <sup>2</sup>	0.065495	-	0.022255	-	0.000946	-	0.169109	-
Adjusted R <sup>2</sup>	0.064695	-	0.021419	-	0.000091	-	0.162668	-
F-statistic	81.93****	-	26.61****	-	1.106743	-	26.25****	-
N	1171	-	1171	-	1171	-	1171	-

Notes: The t-statistics are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The t-statistics are computed using White (1980) covariance estimators. The t-statistics are also estimated using the Newey-West (1987) method with identical results in terms of significance, but they are not included in this article. The variance inflation factor (VIF) quantifies the severity of multicollinearity in our regression model. Assuming 10 as a cut off value (Kutner, 2004), then we can conclude that our independent variables do not have severe problems of multicollinearity.

Table 12 shows our results for the cross-sectional variation of the level of price adjustment based on our second proposed regression model. Like in the results above, our regression model is evaluated twice: with and without our selected control variables. The marketability discount ( $MD_i$ ) is again statistically significant at conventional levels of confidence with and without control variables. This result supports hypothesis H4 about the marketability discount being positively related with the level of price adjustment. Therefore, this result supports our notion that the higher the marketability discount, the greater the uncertainty about the firm's value, and the larger the price adjustment due to that vast vagueness associated with the value of the firm.

Similarly, the period of time between the IPO offer date and the pre-IPO transaction ( $LnPre_i$ ) is also statistically significant at conventional levels of confidence with and without control variables. This result supports hypothesis H5 about the period of time between the IPO and the last pre-IPO transaction date being negatively related with the level of price adjustment. Therefore, this result supports our notion that the influence of the marketability discount in the level of price adjustment is higher (or lower) when the last pre-IPO transactions takes place right (or long) after the IPO date respectively.

Lastly, the coefficient of the number of pre-IPO transactions is not significant at conventional confidence levels with and without control variables. This result does not allow us to provide statistical support for hypothesis H6. However, some of our control variables are also significant at conventional levels of confidence, except for the time between registration and IPO offer date ( $LnDi$ ) and the natural logarithm of total assets ( $LnAssets_i$ ). These results of our control variables are consistent with previous academic works (see Hanley, 1993).

Table 13 shows our results for the cross-sectional variation of the absolute value of the level of price adjustment. Like in the results above, our regression model is evaluated twice: with and without our selected control variables. The marketability discount ( $MD_i$ ) is again statistically significant at conventional levels of confidence with and without control variables. This result also supports our hypothesis H4. Similarly, the period of time between the IPO offer date and the pre-IPO transaction ( $LnPre_i$ ) is also statistically significant at conventional levels of confidence with and without control variables. This result also supports our hypothesis H5. Lastly, the coefficient of the number of pre-IPO transactions is not significant at conventional confidence levels with and without control variables. This result does not allow us to provide statistical support for our hypothesis H6. Finally, most of our control variables are not significant at conventional levels of confidence.

**Table 13.** The results for the cross-sectional variation of the absolute value

	Model 1	VIF	Model 2	VIF	Model 3	VIF	Model 4	VIF
Intercept	0.094 (17.35) ****	7.37	0.1166 (9.611) ****	8.84	0.1045 (16.17) ****	7.32	-0.179 (3.76) ****	8.65
The marketability discount ( $MD_i$ )	0.039 (2.436) **	6.65	-	-	-	-	0.032 (1.98) **	7.47
Time between IPO and pre-IPO transaction ( $LnPre_i$ )	-	-	-0.0019 (1.78) **	4.32	-	-	-0.003 (2.77) ***	9.65
Number of pre-IPO transactions ( $NTrans_i$ )	-	-	-	-	0.0013 (0.615)	3.98	0.0015 (0.673)	1.34
Underwriter reputation ( $UR_i$ )	-	-	-	-	-	-	0.0034 (1.628)	6.54
Time between registration and	-	-	-	-	-	-	0.005 (-0.955)	1.43



IPO offer ( $LnD_i$ )								
NASDAQ ( $NASDAQ_i$ )	-	-	-	-	-	-	0.0011 (0.067)	1.76
% retained by pre-IPO shareholders ( $PreOwn_i$ )	-	-	-	-	-	-	0.024 (0.703)	8.54
Natural Log of Total Assets ( $LnAssets_i$ )	-	-	-	-	-	-	-0.007 (-4.1) ****	1.45
Dummy variable for Internet bubble ( $Bubble_i$ )	-	-	-	-	-	-	0.012 (1.592)	1.23
$R^2$	0.0077	-	0.0004	-	0.00033	-	0.045	-
Adjusted $R^2$	0.0066	-	0.0003	-	0.0002	-	0.036	-
F-statistic	7.285 ****	-	0.4055	-	0.3151	-	4.66 ****	-
N	1171	-	1171	-	1171	-	1171	-

Notes: The t-statistics are shown in parentheses. \*, \*\*, \*\*\*, and \*\*\*\* denote statistical significance at the 10%, 5%, 1%, and 0.1% significance levels, respectively.

The t-statistics are computed using White (1980) covariance estimators. The t-statistics are also estimated using the Newey-West (1987) method with identical results in terms of significance, but they are not included in this article. The variance inflation factor (VIF) quantifies the severity of multicollinearity in our regression model. Assuming 10 as a cut off value (Kutner, 2004), then we can conclude that our independent variables do not have severe problems of multicollinearity.

## CONCLUSIONS

The main goal of this article is to provide empirical evidence about the impact of marketability discount in the Initial Public Offering (IPO) underpricing and price adjustment. We find statistical evidence that the level of IPO underpricing is positively related with the marketability discount. Therefore, this result supports our hypothesis that the marketability discount is a proxy measure of the level of difficulty to appraise a company's value. We also find statistical evidence that the period of time between the IPO date and the last pre-IPO transaction date is negatively related to the level of underpricing. In other words, this result supports our hypothesis that the impact of the marketability discount declines when the period of time between the IPO and the pre-IPO transaction date increases. We also find statistical evidence that supports our hypothesis that the higher the marketability discount, the greater the uncertainty about the value of the firm, and the larger the price adjustment due to that vast vagueness associated with the market value of the firm. We also find statistical evidence supports our hypothesis that the influence of the marketability discount in the level of price adjustment is higher/lower when the last pre-IPO transactions takes place right/long after the IPO date. Finally, we find evidence that the marketability discount declines with the number of pre-IPO transactions and changes over time.

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