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ORGANIZATIONAL CITIZENSHIP BEHAVIOURS, MANAGERIAL TIES AND ORGANIZATIONAL CULTURE: IMPACT ON OPEN INNOVATION MOHMMAD

**MUZAMIL NAQSHBANDI** FACULTY **OF BUSINESS AND** ACCONTANCY **UNIVERSITY OF MALAYA** 1

2012 ORGANIZATIONAL CITIZENSHIP BEHAVIOURS, MANAGERIAL TIES AND ORGANIZATIONAL CULTURE: IMPACT ON OPEN INNOVATION MOHMMAD MUZAMIL NAQSHBANDI

**THESIS SUBMITTED IN** FULFILLMENT **OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY DEPARTMENT OF** BUSINESS STRATEGY **AND** POLICY **FACULTY OF BUSINESS AND** ACCONTANCY **UNIVERSITY OF MALAYA** 2012 **UNIVERSITI MALAYA ORIGINAL LITERARY WORK DECLARATION Name of Candidate:** Mohmmad Muzamil Naqshbandi **(I.C/Passport No:** E2503190) **Registration/Matric No. Name of Degree** : CHA090018 : **Doctor of Philosophy Title of Thesis** 56

("this Work") : Organizational Citizenship Behaviours, Managerial Ties Field of Study and Organizational Culture: Impact on Open Innovation : Strategic Management

**I do solemnly and sincerely declare that: (1) I am the sole author/writer of this Work; (2) This Work is original; (3) Any use of any work in which copyright exists was done by way of fair dealing** and for permitted purposes and any excerpt or extract from, or reference to or reproduction of any copyright work has been disclosed expressly and sufficiently and the title of the Work and its authorship have been acknowledged in this Work; **(4) I do not have any actual knowledge nor do I ought reasonably to know that the making of this work constitutes an infringement of any copyright work; (5) I hereby assign all and every rights in the copyright to this Work to the** University of Malaya ("UM"), who henceforth shall be owner of the copyright in this Work and that any reproduction or use in any form or by any means whatsoever is prohibited without the written consent of UM having been first had and obtained; **(6) I am fully aware that if in the course of making this Work I have infringed any copyright whether intentionally or otherwise, I may be subject to legal action or any other action as may be determined by UM. Candidate's Signature Date: / / Subscribed and solemnly declared before, Witness's Signature Date: / / Name:** Dr Sharan Kaur **Designation:** 10

Senior Lecturer, Faculty of Business and Accountancy. i ABSTRACT Success in the Open Innovation paradigm offers great benefits to firms and supplants their reliance on expensive internal R&D. Many firms have succeeded in the Open Innovation paradigm but failures have also been reported. Being a new area of research, not much is known about the factors affecting Open Innovation. In view of this, the current research was conducted with the aim to study the effects of Organizational Citizenship Behaviours, Organizational Culture and Managerial Ties (predictor variables) on Open Innovation (criterion variable) and to study the moderating role of Regimes of Appropriability on these relationships. Cross-sectional data were

collected using the survey method from 339 middle and top managers working in manufacturing firms in the four high-tech industries in Malaysia. A two-stage sampling procedure involving stratified sampling and convenience sampling techniques was used.

**Hierarchical multiple regression was** employed **to test the hypothesized relationships. The** — 12

results reveal that Organizational Citizenship Behaviors predicts Open Innovation positively and significantly. In addition, Highly Integrative Culture was found to relate positively to In-bound Open Innovation while Hierarchy Culture related negatively. No

**evidence of a significant** relationship **between** Organizational **Culture and** Out-bound Open **Innovation** — 240

was found.

**Managerial Ties with government officials and with** — 9

universities and/or other research centers were found to facilitate In- bound Open Innovation while

**Managerial Ties with managers at other firms** did **not** — 52

significantly affect In-bound Open Innovation. Besides,

**no statistically significant relationship was found between** Managerial Ties **and** — 205

Out-bound Open Innovation. In addition, Regimes of Appropriability was not found to moderate strongly the

**relationships between the** predictor **and the outcome variables.** The **study** — 427

makes many theoretical and managerial contributions which, along with the

**limitations of this research and future research directions, are** highlighted **in** — 308

this thesis. ii ABSTRAK Kejayaan dalam paradigma Inovasi Terbuka memberikan banyak manfaat kepada firma dan menggantikan ketergantungan firma pada Penyelidikan dan Pembangunan dalaman firma. Banyak firma menempah kejayaan dalam paradigma Inovasi Terbuka, namun ada juga firma yang gagal dalam pendekatan ini. Oleh kerana ia merupakan bidang kajian yang baru, tidak banyak yang diketahui tentang faktor-faktor yang mempengaruhi Inovasi Terbuka. Memandangkan kekurangan ini, kajian ini bertujuan mengkaji kesan Kelakuan Warganegara Berorganisasi (Organizational Citizenship Behaviours), Kebudayaan Organisasi (Organizational Culture) dan Hubungan Pengurus (Managerial Ties) pada Inovasi Terbuka dan juga mengkaji pengaruh moderasi “Regimes of Appropriability” pada ketiga-tiga variable Inovasi Terbuka. Data daripada kajian keratan lintang telah dikumpul dengan menggunakan kaedah tinjauan 339 pengurus atasan dan menengah dalam firma pembuatan empat industri teknologi tinggi di Malaysia. Satu kaedah persampelan dua peringkat iaitu pensampelan berstrata dan pensampelan mudah telah digunakan. Regresi

Berganda Berhirarki digunakan untuk menguji hubungan yang dihipotesiskan. Keputusan kajian menunjukkan Kelakuan Warganegara Berorganisasi meramalkan Inovasi Terbuka secara positif dan secara signifikan. Selain daripada itu, Budaya Berintegrasi Tinggi didapati mempunyai hubungan yang positif terhadap Inovasi Dalaman manakala Budaya Berhiraki mempunyai hubungan yang negatif. Tiada bukti yang menunjukkan hubungan signifikan di antara Kebudayaan Organisasi dan Inovasi Luaran. Hubungan Pengurus dengan pegawai kerajaan dan universiti dan/atau pusat-pusat penyelidikan didapati memudahkan Inovasi Dalaman manakala Hubungan Managerial dengan pengurus di firma lain tidak memberi kesan yang signifikan kepada Inovasi Dalaman. Selain daripada itu, tiada hubungan signifikan secara statistic didapati di antara Hubungan Pengurus dan Inovasi Luaran. Selain daripada itu, “Regimes of Appropriability” didapati tidak memoderasikan dengan kuat hubungan di antara pemboleh ubah tak bersandar (Kelakuan Warganegara Berorganisasi, Kebudayaan Organisasi dan Hubungan Pengurus) dan pembolehubah bersandar (Innovasi Terbuka). Banyak implikasi teori pengurusan berserta dengan keterbatasan dan panduan bagi penyelidikan yang akan datang dinyatakan dalam tesis ini. iii ACKNOWLEDGEMENTS To Allah, the Almighty without whose Will not a leaf rustles. To Dr Sharan Kaur, my supervisor who has been amazing in helping me make sense of both the academic and non-academic matters – what an inspiration she is! To Prof Dr Ulrich Lichtenthaler from University of Mannheim in Germany and Assoc Prof Dr Mattia Bianchi from Stockholm School of Economics in Sweden for validating some of the scales used in this study and for being quick to reply whenever emailed for guidance. 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**CHAPTER ONE** **190**

**.....**

**Table 4.** 10: **KMO and Bartlett's Test for** **3**



**This study** firstly **examines the** effects of **Organizational Citizenship** **180**
Behaviours **(OCBs),** Managerial Ties **and**

Organizational Culture on Open Innovation. Secondly, this study investigates the moderating role of Regimes of Appropriability on these relationships. In this study, there are three predictor variables (OCBs, Managerial Ties and Organizational Culture), one criterion variable (Open Innovation) and one moderating varible (Regimes of Appropriability). Of the predictor variables, OCBs consists of three dimensions; Managerial Ties consists of three types; Organizational Culture also has three types, while the criterion variable, Open Innovation has two dimensions: In-bound Open Innovation and Out-bound Open Innovation. 1.1 Overview of the Study Innovation has been the main driver of many firms' growth and sustainability for a long time now; so much so that it has been considered as a "strategic asset" that helps in gaining and maintaining competitive advantage and defending against competition. Long-term competitiveness requires that companies enhance their innovative capabilities to improve their products and processes. It is thus one of the means of ensuring an organization's long-term survival (Mirza & Giroud, 2004). For years, firms relied on the Closed Innovation model to be competitive and

**to bring new** product **and services to the market** **30**

(Chesbrough, 2006). While this model of innovation, also called the traditional/closed model of innovation led to myriad innovations, it involved a very limited interaction with the external environment (Lichtenthaler, 2008). In the case of this Closed Innovation model, the assumption was that the

**innovation processes need to be controlled by the** **15**

firm. Lucent Technologies, for instance, pursued the Closed Innovation model, investing and relying heavily on its internal R&D to stay competitive without interacting much with any external source of knowledge and learning (Chesbrough, 2003b). In the present times, however, due to rapid technological changes taking place and other factors of globalization, sticking to this traditional Closed Innovation model can lead to loss of competitive advantage for a firm. On the other hand, embracing an Open Innovation model can

> **result in important strategic innovations** providing firms with **competitive advantage** 241

(Chesbrough, 2003b). Due to this and many other reasons firms are shifting from the

> **Closed Innovation model to** the **Open Innovation model. In the** 29

Open Innovation model,

> **as the boundaries become porous, there is more interaction between partner firms that results in greater technology acquisition and exploitation (Chesbrough, 2006).** 1

Consequently

> **there is a greater amount of resources and expertise at hand than expected in** the **Closed Innovation model. This has many benefits, one of which is faster innovations.** 1

Besides,

> **as a result of collaboration efforts of the partnering firms, a heady mix of talent and expertise from people working together in new ways often stimulates innovation. This has further been made easier by the advent of information technology that has enabled better coordination of alliance partner value chains and greater integration as demanded by the new global market forces (Shaw, 2000).** 1

For instance, in contrast to the example of Lucent Technologies highlighted above, Cisco Systems is a successful example of a company that embraced Open Innovation and relied heavily on external knowledge retention by forming alliances thereby adopting external knowledge strategy (Chesbrough, 2003b). However, while Open Innovation may offer many benefits to a firm, adopting this

> **model does not seem to be easy as several challenges come in the way of the Open Innovation** 1

process. The Open Innovation process starts with identifying the knowledge sources and then exploiting them. This stage can usually be accompanied by lack of resources either because the project is still new or because the output of the project is not trusted. Or, sometimes managers may not be able to foreknow all uncertainties

> **or fully anticipate the** roles **that they may** want **or need** the **employees to** discharge **(Katz & Kahn, 1978; Organ, 1988).** 1

In their now widely-cited book

> **Open Innovation: Researching a new paradigm,** West, **Vanhaverbeke and** 29

Chesbrough

> **(2006a, pp. 285- 309) underline that innovation is a result of efforts of one or more individuals.** 1

In the Closed Innovation paradigm, such efforts are made within the firm by employees. Similarly, in the Open Innovation model, West et al (2006a) state that

> **such individuals**"certainly" **play a crucial role by being productive and using some combination of intrinsic and extrinsic motivations. In this backdrop,** 1

> **this study** intends **to examine the factors that** are expected to **affect** 99

Open Innovation. Firstly, therefore, this study examines the

> **impact of Organizational Citizenship Behaviours (OCBs) on Open Innovation** 1

outcomes.

> **OCBs shown by the employees may** play **a** crucial role **in** the **success of Open Innovation projects.** 1

Positive employee voluntary behaviours like acting cooperatively, being a team player, giving ideas about improving the product, and encouraging a positive climate, which Organ (1988) termed as OCBs are shown by the activities that are aimed towards other employees

> **in the** office **or** in **the organization. These** activities can **include helping co- workers,** 59

being conscientious toward the work environment, communicating new and critical information, actively taking part

> **in decision processes and discussions, and** not **complaining about minor** 83

issues (Yen, Li, & Niehoff, 2008). OCBs performed by the employees of a firm exceed the minimum job requirements as anticipated by the employer and advance the well-being of the co-workers, the organization or the work groups. At the same time, organizations rely on the employees' practice of OCBs to encourage a positive work atmosphere, to assist other employees with any problems, be more tolerable of any inconveniences, and protect resources of the firm (Witt, 1991). Organ (1988) argues that in the aggregate

OCBs have a major beneficial impact on organizational operations and effectiveness. OCBs may also

> **enhance the ability of** an **organization to** adjust **to** environmental **changes** — 439

(Podsakoff & MacKenzie, 1997). Since embarking on the Open Innovation paradigm involves adapting to new external environment changes and conditions, OCBs as suggested by Podsakoff and MacKenzie (1997) may also be able to improve the

> **outcomes of Open Innovation. Secondly,** this study examines **the relationship between Managerial Ties and Open Innovation.** — 1

> **Resource dependence theory** suggests **that managerial** ties **with groups and individuals outside the organization can** act **as a substitute** — 43

in lowering the firms' dependence on critical resource (Pfeffer & Salancik, 2003). On the other hand, the

> **social network theory** argues that **managerial ties** can **provide informational and control benefits** to **organizations, and may even** benefit **competition (Burt,** — 43

1997b). In this backdrop, Open Innovation relies on identification of proper and compatible knowledge sources and later their exploitation to create value. This leads to several impediments in the way of

> **Open Innovation** process. **Open Innovation involves reliance on inter-organizational relationships to internalize external ideas from different innovation sources** — 1

(In-bound Open Innovation) and

> **sell the ideas that are developed within the firm but** — 1

may not be in sync with the firm's current business model (Out-bound Open Innovation). Therefore, a firm needs to establish relations with different partners which could be universities and research institutions, suppliers, users and other firms (Chesbrough, 2006; Chesbrough, Vanhaverbeke, & West, 2006; Emden, Calantone, & Droge, 2006; Perkmann & Walsh, 2007; Von Hippel, 2005).

> **Such firms** look **for new ideas and technologies by increasing the search breath (the number of** innovation **sources they** depend **upon** — 1

for creating innovation) and the search depth (the degree/depth to which firms utilize their external knowledge

> **sources) of their innovation networks (Laursen & Salter, 2006).** — 1

Developing such relationships

> **however may not be easy and a firm may face several challenges. For instance, how would firms identify appropriate knowledge sources? How would firms explore and choose right firm partners collaborating with whom will create value for the firm (West, Vanhaverbeke, & Chesbrough, 2006b)? How would firms interact with the potential knowledge sources and how would the process of Open Innovation start?** 1

In addition,

> **given the diversity of partners in the Open Innovation model,** 1

the

> **activities of acquisition, assimilation, transformation and exploitation (Zahra & George, 2002) become all the more complex.** 1

This is where the role of Managerial Ties becomes paramount.

> **Well-networked managers can help a firm identify and exploit proper sources of knowledge and use them to the advantage of the firm,** 1

thus facilitating the process of Open Innovation. The role of Managerial Ties is not to be underestimated as Managerial Ties, particularly in transition economies, have been found to even help firms

> **enhance and gain competitive advantage over** their **competitors (Li & Zhou, 2010; Thorelli, 1986). Thirdly,** this study examines **the** 1

> **relationship between Organizational Culture and** Open Innovation. **According to** Carbone, Contreras, **and** 395

Hernandez (2010), the

> **introduction of the Open Innovation paradigm in an enterprise requires not just a modification of the corporate process of innovation but also a cultural change.** 75

Lichtenthaler (2011) further mentions that Open Innovation processes involve foreign partners, and this adds an international dimension to it; and leads to cultural issues which deserve further analysis. There is hardly an empirical study about the relationship between Organizational Culture and Open Innovation. This seems to

> **be due to the fact that Open Innovation is a** 173

rather new research area and there clearly is a need for further theoretical and empirical research (Lichtenthaler, 2011). One of the most prolific authors on Open Innovation (Scopus, 2011), Lichtenthaler (2011) particularly highlights the link between Organizational Culture and Open Innovation as a 'fruitful avenue' for investigation.

**Pool (2000) suggested that Organizational Culture** allows **an organization to address ever-changing problems of adaptation to the external environment and the internal integration of organization resources, personnel and policies to support external adaptation. Therefore,** 19

in addition to helping in predicting the success of Open Innovation initiatives in many ways, an understanding of what type of Organizational Culture relate positively to Open Innovation can also give insights into the degree of openness a firm should practise (Lichtenthaler, 2011). Fourthly, this study intends to

**examine the moderating role of Regimes** of Appropriability **on the** relationships **between OCBs,** Managerial Ties **and** Organizational Culture and **Open Innovation.** 1

OCBs, Managerial Ties and Organizational Culture alone may not be able to lead to success in the Open Innovation paradigm.

**A firm's** favorable **internal resources and** conditions **may not** always **be** enough **to** 29

lead it to successful Open Innovation. Success of a firm in general is contingent upon its understanding of the external environment to survive volatile times (Yeo, 2005).

**Before creating any kind of innovation, it is important for a firm to measure its potential benefits and check whether it can appropriate the results of its innovative activities.** 1

Securing results of any innovation is paramount for the firms that invest in such innovation activities as it allows them the fruits of

**their innovations (González-Álvarez & Nieto-Antolín, 2007).** Therefore, Regimes **of Appropriability,** 1

sometimes also called Appropriability Regimes, become an important moderating factor in the relationships

**between OCBs, Managerial Ties** Organizational Culture **and Open Innovation. Appropriability,** 1

as Atkins (1998) defines is "the ability of different stakeholders to retain for themselves the financial benefits that arise through the exploitation of an innovation". If the

**firm that creates innovation is the main beneficiary of the innovation,** 1

the situation is called ‘strong appropriability regime’, and if the

**creator of innovation gains less than other stakeholders,** 1

it is referred to as ‘weak appropriability regime’. The role of appropriability in Open Innovation outcomes remains not only hazy but contradictory also.

**According to the conventional view, strong appropriability regimes create increased willingness among innovators to offer internal innovations for others to use thereby enhancing Open Innovation outcomes (Chesbrough,** 2003a). **However,** 1

in contrast to this,

**Laursen and Salter (2005) found through a large-scale survey that Open Innovation provides better results in moderate regimes** of appropriability. **Adding to** the **difference in results,** 1

**Fabrizio (2005) reported negative relationship between high appropriability and aspects of Open Innovation.** 1

Hence

**no clear role of the appropriability regimes is established in the literature.** Nevertheless, reconnoitring **the** Regimes of **Appropriability** of the industry **and** 1

establishing their role in the Open Innovation paradigm can help determine ex ante the benefits of potential Open Innovations.

**Since the relationship between appropriability and Open Innovation does not seem to be a simple linear causal relationship, responding to the call for further research by West et al (2006b),** this study aims **to identify** the moderating **effects of Regimes of Appropriability** 1

between the predictor variables of this study and Open Innovation. The remainder of this chapter takes the following structure. The following

**section 1.2 discusses the** problem statement. **Section 1.3** elaborates on **the** 136

scope of this study and Section 1.4 discusses Open Innovation in relation to Malaysia. This is followed by

presentation of research objective in section 1.5. In section 1.6, research questions are discussed. Research hypotheses are examined in section 1.7.

**This is followed by a** brief **discussion** on **the theoretical** framework **of** 27

this study in section 1.8. Lastly in section 1.9, the contributions of this research are highlighted briefly. 1.2 Problem Statement Success in the Open Innovation paradigm offers great benefits to firms and supplants their reliance on expensive internal R&D. Many firms have succeeded in the Open Innovation paradigm but failures have also been reported. Several factors influence the success of Open Innovation. These range from internal to external factors. The role of many of these factors remains hazy. The role of four such factors, Organizational Citizenship Behaviours, Managerial Ties, Organizational Culture and Regimes of Appropriability in facilitating Open Innovation ranges from being inconclusive to doubtful to contradictory and even unstudied as is shown by many studies. This not only affects the outcomes of Open Innovation but also adds to uncertainty regarding the value-creation of Open Innovation which jeopardizes the earning potential. An understanding of how these variables operate in creating successful Open Innovation can rule out many failures related to the adoption of Open Innovation.

**1.3** Scope **of the Study The** scope **of this study is** limited **to** 135

manufacturing firms in Malaysia. Specifically, the theoretical framework developed in this study will be tested in the high-tech sector in Malaysia which consists of four industries namely Aerospace industry,

**Computers and Office Machinery** industry, **Electronics and Communications** 55

industry, and Pharmaceuticals industry. The chances of Open Innovation being practiced in these industries are expected to be higher than in, say, medium- or low-tech industries

**(van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009).** 338

To the best of this researcher's ken, no previous study explores Open Innovation in the high-tech sector in Malaysia. 1.4 Open Innovation and Malaysia

**Open Innovation is a** recent **area of research** in the field **of** 15

management that aims at

**improving the innovation processes of enterprises, based on the collaborative creation and development of ideas and products** 75

(Carbone et al., 2010). Globally many industry leaders, such as Nestle, 3M, GE, Goodyear, Xerox, and BP are already successful leading practitioners of Open Innovation (Evan, 2009).

**At the same time, a large number of** 425

researchers have taken interest in this evolving theme in Management which is evidenced by the increasing number of papers appearing on the topic

**of Open Innovation. Open Innovation has** therefore caught **the** interest **of** 389

practitioners as well as researchers (Lichtenthaler & Lichtenthaler, 2010; Savitskaya, Salmi, & Torkkeli, 2010). The idea of Open Innovation as we know it today emerged in the West. Therefore most of the research on this theme has been conducted in the West. Given the recency of the Open Innovation theme, the practice of Open Innovation in the Western context is fairly documented while in the Asian context, there is not that much Open Innovation activity (Lindegaard, 2012). However, of late Open Innovation research, providing evidence of Open Innovation, has started to trickle from the Asian countries (cf. Abulrub & Lee, 2012; Lee, Park, Yoon, & Park, 2010). Due to the impact Open Innovation can have on an organization at the micro level or on a country at the macro level,

**Open Innovation requires extensive empirical investigation, testing and development** 358

(De Jong, Vanhaverbeke, & de Vrande, 2007) not only in the West but in the East as well. As of now, not much is known about Open Innovation adoption in Malaysia. However, recognizing the benefits of Open Innovation, a top Malaysian executive,

**Dr Roger Wyse, Co-chairman/director** of the **Malaysian Life Sciences Capital Fund (MLSCF)** 272

exhorted

**Malaysian companies to adopt the Open Innovation model** 438

to create more investment opportunities and stimulate economic growth of the country by leveraging internal and external sources of ideas (Bernama, October 25, 2011). The executive spoke

**of Open Innovation in** 480

these words: "Open Innovation is a necessary paradigm for companies to remain competitive and for countries to make the leap to the next phase of economic development. Sole reliance on organic innovation is too slow and costly. The Malaysian firms must identify, adapt and integrate global innovation in sectors where Malaysia has a sustainable competitive market advantage" (Bernama, October 25, 2011). In addition, according to Lindegaard (2012), Malaysia is the most promising country for Open Innovation in Asia due to its potential to become the Open Innovation hub in Asia. In Asia, according to the author, Malaysia is followed in ranking by South Korea, Singapore, China and Japan. 1.5

**Research Objectives This study** aims: • **To** examine **the effects of** 178

different dimensions of Organizational Citizenship Behaviors on Open Innovation. •

**To examine the effects of different types of** Managerial Ties **on** 53

Open Innovation. •

**To examine the** effect **of different types of** Organizational Cultures **on** 53

Open Innovation. •

**To investigate the moderating effect of** Regimes of Appropriability **on the relations between** OCBs, Managerial Ties **and** 88

Organizational Culture, and Open Innovation. 1.6 Research Questions Following are the

**research questions** of **this study: • What is the** nature of **relationship between** 204

the different dimensions of Organizational Citizenship Behaviors and Open Innovation? • What is the

**nature of relationship between** the **different types of** Managerial Ties **and** 85

Open Innovation? • What is the nature of

**relationship between the different types of Organizational** Cultures **and** 18

Open Innovation? • What is the

**moderating role of Regimes** of Appropriability **on the** relations **between** the predictors **and** 1

criterion variables of this study? 1

**.7 Research** Hypotheses **Based on the review of** literature, **the** 78

following twenty two (22) hypotheses were developed to be tested in this study: 1.7.1 OCB and Open Innovation H1a:

**There is a positive relationship between** Altruism **and** In-bound Open **Innovation** 8

in that Altruism facilitates In-bound Open Innovation. H1b:

**There is a positive relationship between** Altruism **and** Out-bound Open **Innovation** 8

in that Altruism facilitates Out-bound Open Innovation. H2a:

**There is a positive relationship between** Conscientiousness **and** In-bound Open **Innovation** 8

in that Conscientiousness facilitates In-bound Open Innovation. H2b:

> **There is a positive relationship between** Conscientiousness **and** Out-bound Open **Innovation** **8**

in that Conscientiousness facilitates Out-bound Open Innovation. H3a:

> **There is a positive relationship between** Sportsmanship **and** In-bound Open **Innovation** **8**

in that Sportsmanship facilitates In-bound Open Innovation. H3b:

> **There is a positive relationship between** Sportsmanship **and** Out-bound Open **Innovation** **8**

in that Sportsmanship facilitates Out-bound Open Innovation. 1.7.2 Managerial Ties and Open Innovation H4a: Managerial Ties with Government Officials facilitate In-bound Open Innovation. H4b: Managerial Ties with Government Officials facilitate Out-bound Open Innovation. H5a:

> **Managerial Ties with Managers at other firms** **9**

facilitate In-bound Open Innovation. H5b:

> **Managerial Ties with Managers at other firms** **9**

facilitate Out-bound Open Innovation. H6a: Managerial

> **Ties with Universities and/** or **other Research Centers** **24**

facilitate In- bound Open Innovation. H6b: Managerial

> **Ties with Universities and/** or **other Research Centers** **24**

facilitate Out- bound Open Innovation. 1.7.3 Organizational Culture and Open Innovation H7a: Highly Integrative Organizational Culture relates positively to In-bound Open Innovation. H7b: Highly Integrative organizational relates positively to Out-bound Open Innovation. H8a: Hierarchy Organizational Culture relates negatively to In-bound Open Innovation. H8b: Hierarchy Organizational Culture relates negatively to Out-bound Open Innovation. 1.7.4 Regimes of Appropriability and Open Innovation H9a: Regimes of Appropriability moderates the relationship between OCBs and In- bound Open Innovation. H9b: Regimes of Appropriability moderates the relationship between OCBs and Out- bound Open Innovation. H10a: Regimes of Appropriability moderates the relationship between Managerial Ties and In-bound Open Innovation. H10b: Regimes of Appropriability moderates the relationship between Managerial Ties and Out-bound Open Innovation. H11a: Regimes of Appropriability moderates the

> **relationship between Organizational Culture and** In-bound Open **Innovation.** H11b: Regimes **of** **125**

Appropriability

**moderates the relationship between Organizational Culture and** 165

Out-bound Open Innovation. 1.8 Research Framework The research frame-work in this study consists of three predictor variables, one criterion variable and a moderating variable. The three predictor variables are: Organizational Citizenship Behaviour, Managerial Ties and Organizational Culture. Open Innovation is the criterion variable in this study while Regimes of Appropriability is the moderating variable. The first predictor variable in this study, Organizational Citizenship Behaviour has three dimensions: a) Altruism, b) Conscientiousness and, c) Sportsmanship. The second predictor variable in this study, Managerial Ties has three types: a) Ties with officials, b) Ties with managers and, c) Ties with R&D centers. The third predictor variable in this study, Organizational Culture, has five dimensions namely: a)

**Employee Development,** b) **Harmony,** c) **Customer Orientation,** d) **Social Responsibility and,** e) **Innovation.** Based on **the** 2

most interpretable results of cluster analysis performed on these five dimensions of Organizational Culture, three types of Organizational Cultures are formed, which are: Highly Integrative Culture,

**Moderately Integrative Culture and Hierarchy Culture.** Creating these three **Organizational Culture** 2

types is in line with a previous seminal study by Tsui, Wang, and Xin (2006). The only criterion variable in this study, Open Innovation has two dimensions: In-bound Open Innovation and Out- bound Open Innovation. This study also has a moderating variable: Regimes of Appropriability. The research framework is shown below figuratively:

**Figure 1.1:** Research framework **of the study 1.** 9 Contribution **of the Study** This **study is** expected **to** make several **theoretical and practical** 48

contributions. This study explores the factors that affect Open Innovation in Malaysia. The effects of these factors have not been examined before empirically. Hence this study will contribute to the theory by exploring how the dimensions of Organizational Citizenship Behaviours operate when it comes to facilitating Open Innovation. An examination of Organizational Citizenship Behaviours in relation to Open Innovation will provide guidelines to firms about which dimensions of Organizational Citizenship Behaviours affect Open Innovation positively. Secondly, this study is expected to explore whether or not having different types of Managerial Ties with different parties is useful for Open Innovation. The practical contribution of this would be an understanding of what type of Managerial Ties to cultivate and which ones to avoid in order to facilitate Open Innovation. Thirdly, this study contributes by exploring Organizational Culture dimensions of the firms operating in the high-tech industry in Malaysia. This is done using the instrument developed by Tsui

**et al. (2006)** which, **to the best of** this researcher's **knowledge, has** never **been** 313

used in the Malaysia context. Hence, while this study validates this instrument in the Malaysian context, it also examines what types of Organizational Cultures encourage Open Innovation and what types are detrimental to it. A direct consequence of this understanding is that it would help practitioners nurture the Organizational Culture types in their organizations that are found to affect Open Innovation positively. This can also help firms predict, based on their Organizational Culture, whether they should embark on an Open Innovation journey or whether they should ensure first that their Organizational Culture is conducive for the

Open Innovation model. In addition, theoretically, this study is expected to clarify the role of Regimes of Appropriability with respect to Open Innovation. Currently, there seems to be a lot of confusion in the literature as to whether Regimes of Appropriability has any moderating effect on Open Innovation; the result of this study are also expected to remove this confusion, at least in the Malaysian context.

**CHAPTER TWO LITERATURE REVIEW 2.0 Introduction This chapter reviews the literature** related to **the** variables **of** 255

interest in this study. The literature

**review of** all **the** variables **is presented in** a thematic manner. **Section 2.** 1 discusses **the** 346

literature on Open Innovation, the only criterion variable of this study.

**Section 2.** 2 **presents a** discussion of **literature review** on **the** 470

first predictor variable, Organizational Citizenship Behaviours. Section 2.3 highlights relevant literature on the second predictor variable in this study, Managerial Ties.

**Section 2.** 4 **reviews the** relevant **literature on the** third predictor variable **of** 435

this study, Organizational Culture. In section 2.5, the literature on the only moderator in this study, Regimes of Appropriability is discussed. Lastly, in section 2.6 the theoretical underpinning of this study is explained. 2.1 Open Innovation 2.1.1 Definition of

**Open Innovation The term Open Innovation was** introduced and popularized **by Henry Chesbrough,** 298

a professor at

**University of California,** Berkeley. Chesbrough **defined Open Innovation as:** 460

"the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough et al., 2006).

**Since Chesbrough's introductory work on Open Innovation,** this **paradigm has emerged as an alternative model of innovation** 1

**that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. The Open Innovation process** 30

provides for

> **projects** to **be** initiated **from internal or external sources.** Similarly, **new technology can** come in **at** different **stages.** 15

Besides traditional sales channels,

> **projects can go to** the **market in** different **ways, such as** through **out-licensing or spin-off** ventures (Chesbrough, 2003a). **In** 15

one of his definitive articles, Chesbrough (2003b) lists down the principles that distinguish closed innovation from Open Innovation. According to Chesbrough, firms in the closed innovation model assumes that: a) the sharp employees in the field work with them, b) discovering, developing and shipping by the firm ensures profits, c) if the firm discovers it themselves, it can get it to the market first, d) the firm will win only if it commercializes the innovation, e) the firm

> **will win if the most and the best** deals **in the industry** 285

are created by it, f) the firm should control the intellectual property so that the competitors are not able to exploit the protected intellectual property. On the other hand,

> **firms operating in the Open Innovation paradigm** assume that: **a) all** the sharp and **smart people** do not **work** inside the firm **and thus there is a need to** use and exploit **external knowledge** sources, **b) external** research and development **can** create **value** for the firm, **c) research** 1

can be profitable to the firm even if it did not originate inside the firm,

> **d) a strong business model** has **more** significance **than bringing products to the market first, e) internal and external ideas are** necessary **to win and, f)** a firm **can** benefit from their **own IP** while it **should** 1

also benefit from the IP of other firms whenever necessary (Chesbrough, 2003b).

> **Chesbrough et al (2006)** consider **the Open Innovation model** 217

> **as the** opposite **of the traditional,** vertically integrated **model** wherein **internal research and development** 186

(R&D) efforts of a firm lead to products developed internally and distributed thereafter. Besides many disadvantages of the closed innovation model, its one limitation is that monolithic organizations that carry out business in isolation develop fragmented linkages and poor interfaces (Govindarajan & Trimble, 2005). However,

> **Open Innovation explicitly** considers **the business model as the** fountain head **of value creation and value capture, helping a firm sustain its position in the industry while at the same time sharing the task of value** 1

**creation across industry value chain (Chesbrough, et al., 2006). In an Open Innovation paradigm,** valuable **ideas**

**can come from inside** or **outside of the** firm **and can** reach **the market through similar channels.** 1

Therefore, the Open Innovation approach considers the

**external ideas and external paths to market** 462

equally important

**as internal ideas and internal paths to market** (Chesbrough, 2003a). According **to Chesbrough et al (2006),** 256

the Open Innovation model regards R&D

**as an**"open system" **in which ideas can come from both inside and outside of the organization and can go to the market through similar channels.** 1

Thus Open Innovation also refers to the innovation process in

**which the boundaries of the firm are porous** 241

(Chesbrough, 2003a).

**This is often a result of an alliance or** collaboration **or any such agreement between firms and since the knowledge is distributed, the innovation process is also distributed among the players involved in this process (Acha & Cusmano, 2005). As the boundaries become porous, there is more interaction between partner firms that results in greater technology acquisition and exploitation (Chesbrough, 2006). As a result there is a greater amount of resources and expertise at hand than expected in a closed innovation model. This has many benefits, one of which is faster innovations. Further, to adapt to global change, organizations focus on their core competency by looking outside and relying on other companies to provide complementary capabilities (Hagel & Brown, 2005). This is also one of the reasons why strategic alliances between organizations are becoming increasingly important for capturing and internalizing knowledge (Parise & Henderson, 2001; Paswan, 2003).** 1

The next section discusses the dimension of Open Innovation. 2.1.2 Dimensions of Open Innovation In their seminal work, Chesborough et al (2006) divide Open Innovation into two conceptually different dimensions: In-bound or outside-in Open Innovation and Out- bound or inside-out Open Innovation. Quite similar to this

dimensionalizing of Open Innovation, Dahlander et al. (2010) reviewed 150 papers published on Open Innovation in the ISI database and concluded that there are

> **two types of Open Innovation:** In-bound **and** Out-bound **Open Innovation.** 453

a) In-bound or Outside-in Open Innovation In-bound or

> **outside-in Open Innovation** refers to **the** use **of** 197

discoveries that others make and involves

> **opening up to and** establishing **relationships with external** firms **with the** aim **to access their** 64

competencies

> **in order to** enhance **the firm's innovation performance.** 230

It implies purposive inflows of knowledge or technology exploration relating to innovation activities aimed at capturing and benefiting

> **from external sources of knowledge to enhance current technological developments.** 4

According to Dahlander and Gann (2010), the In-bound innovation entails two processes termed sourcing and acquiring. Sourcing

> **refers to how firms can use external sources of innovation** 199

after they scan the external environment for possible ideas and technologies. Acquiring is defined as acquiring

> **inputs to the innovation process** through **the market place.** 87

This can happen through licensing-in and acquiring expertise from the external environment. Sourcing is non-pecuniary in nature and may not bring any direct financial benefits to a firm while acquiring is pecuniary and is undertaken with profit-making in mind. Based on an empirical database of 124 firms, Gassmann and Enkel (2004) concluded that the

> **outside-in** dimension **of Open Innovation** enriches **a company's** 383

knowledge base and innovative capabilities due to greater integration of customers, suppliers, and external knowledge sources. Chesbrough and Crowther (2006) reported that the main motives for firms to engage in In-bound Open Innovation were growth and revenue. b) Out-bound or Inside-out Open Innovation Out-bound or inside-out dimension implies that firms can search for external players that have better fitting business models to exploit and commercialise a particular technology than just depend on internal paths to market

(Vanhaverbeke, 2006). It refers to the

> **purposive outflows of knowledge,** or **technology exploitation,** 4

meant

> **to leverage existing technological capabilities outside the boundaries of the organization.** 4

The

> **external exploitation of ideas** can happen **in different markets** by **selling** intellectual property rights **and multiplying technology by** diverting **ideas to the external environment** 209

(Gassmann & Enkel, 2004). The aim however remains to exploit better innovation opportunities. In addition, Out-bound Open Innovation involves

> **opening up the innovation process** for **technology exploitation** and **outward technology** 208

(Lichtenthaler, 2009). Like In-bound Open Innovation, Out-bound innovation also involves two processes which are revealing and selling. Revealing as the name suggests

> **refers to how internal resources** of a firm **are** disclosed **to the external environment** 87

without the firm hoping for any

> **immediate financial rewards** and **seeking indirect benefits** 210

only. Thus revealing is non-pecuniary in nature. Selling implies how firms accrue benefits by commercialising

> **their inventions and technologies through selling or licensing out to other** 87

firms (Dahlander & Gann, 2010). Selling therefore is pecuniary in nature and is undertaken for direct profit to the firm. Both the dimensions of Open Innovation are important in performing Open Innovation practices (Parida, Westerberg, & Frishammar, 2011).

> **In a fully open setting, firms combine both technology exploitation and technology exploration in order to create maximum value from their technological capabilities or other competencies (Chesbrough & Crowther, 2006; Lichtenthaler, 2008).** 4

However, while firms may adopt both the dimension of Open Innovation, research seems to suggest that the

Out-bound processes of Open Innovation may not be as widespread as the In-bound processes (Chesbrough & Crowther, 2006; Enkel, Gassmann, & Chesbrough, 2009). Parida et al. (2011) believe that this

> **can be** due **to the fact that** starting with **Open Innovation** 29

practices in an exploitation mode is more challenging. By first engaging in exploration using Open Innovation ideas,

> **firms may find it more** feasible later **to exploit the** 436

ideas in a more open fashion. There may thus be an element of path dependence, where exploration precedes exploitation in the general case. In addition to the two dimensions of Open Innovation highlighted above, Gassmann and Enkel (2004) identified a third dimension which they called “the coupled process” and defined as a process that links

> **outside-in and inside-out processes** of Open Innovation **by working in alliances with complementary** companies involving **give and take** as **crucial** elements of **success.** 29

However, not many researchers have written about this dimension/process of Open Innovation. The next section discusses the advantages of Open Innovation. 2.1.3 Advantages of Open Innovation

> **Open Innovation offers many advantages to firms adopting this model. Firms create value externally by acquiring skills and knowledge from partners to complement the internal capabilities of their organizations (Love,** Irani, Cheng, & Li, **2002). Some of the reasons for firms to enter into collaborative relationships are to improve innovation, increase speed to market, and reduce the costs of internal vertical integration. When the partner firms share information, it improves their efficiency and helps them focus on joint opportunity recognition (Moffat & Archer, 2004). If the partner firms have compatible goals and they pool their resources, it creates increased value for the partner organizations as well as the customers (Kesler, 2002). This joining of hands finally provides for the potential for improved designs, shorter lead times, and greater customer value (Ragatz, Handfield, & Petersen, 2002).** 1

Such collaborations can also result in engagements of different forms with suppliers, customers, competitors, complementors, or even partners outside the industry (Parise & Henderson, 2001). Similarly, different forms of such alliances may have varied objectives. For instance, alliances may be formed to support a specific project (Love et al., 2002). To gain valuable market insight and an intimate understanding of the customer, environment, culture, situation dynamics and create value, firms may enter into relationship-specific alliances (Subramani, 2004). Sometimes firms may engage in cooperative alliances to enhance their portfolios of capabilities as well (Taylor, 2005). van de Vrande et al. (2009) mention that besides market-related motives, Open Innovation may serve the firms (the study is about Dutch SMEs) by providing access to missing knowledge, complementary resources and by sharing risk. In the case of collaborating firms, such benefits were also highlighted by Koruna (2004). Moreover, firms may also gain non- financial benefits from Open Innovation like better customer satisfaction etc. Chesbrough and

**Crowther (2006) in an interview-based study found that the** commonest **reason for** 4

firms to adopt Open Innovation was that Open Innovation helped critically in maintaining growth. This was corroborated by

**van de Vrande et al. (2009)** who reported **that SMEs** use several **Open Innovation practices** 210

simultaneously

**to serve customers effectively or to open up new markets, with higher-order objectives to secure revenues and to maintain growth.** 4

**As a result of collaboration efforts of the partnering firms, a heady mix of talent and expertise from people working together in new ways often stimulates innovation. This has further been made easier by the advent of information technology** which **has enabled better coordination of alliance partner value chains and greater integration as demanded by the new global market forces (Shaw, 2000). Research has shown that effective collaboration with external partners like** suppliers, **buyers, and other organizations is** 1

a contributing factor to innovation

**(Faems, Van Looy, & Debackere, 2005; Ritter & Gemünden, 2004).** 1

Learning to access and partner with organizations who bring resources and capabilities creates value in unprecedented ways (Palmisano, 2006). Through networks and alliances, Open Innovation gives a flip to the human and social capital. The value of the organizations is linked to the current and prospective engagements with the tangible and intangible influences of the other organization (Lev & Zambon, 2003). Many firms have realised the benefits of engaging in Open Innovation in several spheres. Vanhaverbeke et al (2008) looked at the advantage of working in Open Innovation style in external corporate venturing. In real option terms, Open Innovation gives companies a chance to scan through a wide array of technologies or new market developments, instead of just investing in internal projects alone. This has financial value for the focal firm as there can be different opportunities available, and some of these may not be aligned or correlated with internally perceived opportunities

**(Vanhaverbeke, Van de Vrande, & Chesbrough, 2008).** In **the** case **of** 424

external corporate venturing in the Open Innovation paradigm, the innovating firms in question also gain from delayed entry or delayed financial commitment. The benefits may also come from an option of early exit and the chance to create some value from projects that are difficult to go forward internally. Besides as the venture grows and matures, the firm can decide on whether to spin in the venture or to sell it off to external financiers like venture capitalists (Vanhaverbeke et al., 2008). This can bring profit to the firm as well. For these and other reasons discussed in up-coming sections, firms are moving

**from the closed innovation** model **to the Open Innovation** 402

strategies. 2.1.4

**Shift from Closed to Open Innovation** 138

paradigm Kemppainen and Vepsäläinen (2003) heralded how firms will change between 2003 and 2010 in terms of strategic orientation by predicting that industries will shift from functional participation toward broader collaborative participation. In

**his book,**"Open Innovation - The new imperative for Creating and Profiting from Technology"**Chesbrough** (2003a), **explains how in the 20 th century firms profited from innovations that were outcomes of heavy investments in internal research and development of firms. However, with the changing times towards the end of the 20 th century,** many **factors combined together to cause the closed innovation process to break up in the United States. The two main such factors were: 1) Rise in the number and mobility of knowledge workers and 2) Growing availability of private venture capital. While the increase in the number and mobility of knowledge workers made it** hard **for companies to** safeguard **their proprietary ideas and expertise,** a spike in **availability of private venture capital** spurred financing of **new firms and** commercialization of **new ideas that would otherwise be found useless or less useful in corporate research labs. This paved the way for more Open Innovation (Chesbrough,** 1

2003b).

**Given the urgencies of the global markets, it becomes imperative on the organizations and new entrants to regenerate their core strategies and reinvent their industries by developing sustainable core competencies (Prahalad & Hamel, 1994). Organizations that sense the changing environment create focus on the right metrics, align and mobilize the entire organization, implement quickly, and create a generative learning environment to stay competitive (Pietersen, 2001). Hence to lead in the global markets, organizations must think outside their own business units and leverage resources of a coalitions of companies (Prahalad & Hamel, 1994). The Open Innovation paradigm provides exactly that.** 1

In addition, the

**advances in information technology and the forces of globalization have increased the demand for pooling complementary assets of external organizations (Archabal,** Badgett, Chu, & Kalyanam, **2005).** 1

Further, competition causes organizations to come up with new products with improved quality, lower cost, and greater intellectual capital (Ragatz et al., 2002). Chesbrough and Crowther (2006) conducted a qualitative study of the asset-intensive industries and identified some more

> **reasons for the shift to Open Innovation** paradigm: **profitable growth, improvement in product margins, perceived inability to meet corporate growth objectives** without turning **to external technologies, increased speed to market, cost reduction and monitoring of potentially disruptive technologies.** 1

Besides, ever-changing markets and cost of doing business force organizations to look beyond their organizational structure for competencies (Parise & Henderson, 2001). This is one of the main aims of entering into strategic alliance or collaborations whereby firms form inter- and intra-organizational relationships to engage partners in collaborative behaviour and to tap into resources exterior to the firm (Love et al., 2002). This is noticeable even among the industries that historically invested in internal R&D to innovate. For instance, Ili, Albers, and Miller (2010) studied 42 automotive industry and because of increasing innovation, cost pressure, globalization, technology intensity and fusion, the authors conclude

> **that Open Innovation is far better** to achieve **better R&D productivity** 41

than a closed innovation model. As stated above,

> **globalization has also in many ways further** made it necessary **to collaborate with external** firms **in the Open Innovation process. The effects of globalization in terms of increased competition, increased mobility of skilled workers, shorter product life cycles, higher risks and lower profit margins have forced** the **firms to** diffuse **risk and develop new products and services quickly and efficiently (Chesbrough,** 2003a). **In addition, complex environments that are a result of increased collaborations between different players have in many ways necessitated the shift from closed to open systems that facilitate informal behaviour to match situational and contextual factors (Brodbeck, 2002).** 1

Furthermore, Dahlander et al. (2010) came up with four reasons for the currency of Open Innovation. Firstly, Open Innovation shows social and economic changes with respect to the working patterns. The professionals now tend to seek portfolio careers instead of a permanent job-for-life working for a single employer 1 . Hence

> **firms need to** tailor **their** approach **in order to access** 412

talent that may not be ready for direct and exclusive employment. Secondly, globalization has expanded the extent of the market allowing for an increased division of labour. Thirdly, well-controlled institutions such as

> **intellectual property rights, venture capital, and technology standards** 385

make the firms feel safe to trade ideas. Fourthly, new technologies have added a new dimension to the ways firms collaborate and coordinate across geographical distances (Dahlander & Gann, 2010).

**Research has shown that effective collaboration with external partners like** 1

1 This may not be completely true, particularly after the subprime mortgage crisis in the USA in 2008 and current (2012) debt crisis in Europe. suppliers, buyers, and other firms

**is one of the important factors for innovation (Faems** et al., **2005; Ritter & Gemünden, 2004).** 1

Learning to access and partner with organizations who bring resources and capabilities creates value in unprecedented ways (Palmisano, 2006). Adding a new angle to the switch from closed to Open Innovation paradigm, recent research has shown that Open Innovation may also be

**a result of** the **internal weaknesses** of a firm, **specifically, impediments to innovation** 192

(Keupp & Gassmann, 2009). These impediments could be information- and capabilities-related impediments or risk-related. Keupp et al (2009) show that these internal

**impediments to innovation influence the** width **and depth** of **Open Innovation** 192

– width being the number of sources or external actors a firm uses for its Open Innovation activities and depth meaning the intensity of collaboration with each source (Laursen & Salter, 2006). Research shows that the firms with internal innovatory activities facing information- and capabilities- related impediments or risk-related

**impediments to innovation are more likely to use** Open Innovation with **more** intensity in **both** width **and** 287

depth (Keupp & Gassmann, 2009). A good case study on the shift to Open Innovation is the journey of Italcementi. An Italian cement manufacturer, Italcementi evolved from operating in the closed innovation model to operating in the Open Innovation paradigm. This firm operated in a mature and asset-intensive industry and adjusted its organizational and managerial systems to suit the Open Innovation paradigm by bringing in a series of changes in the organization. During the early 1990s, Italcementi focused on the Italian cement market, where, in presence of a few small players working on a local basis, it operated with an indisputable leadership. As a result of lack of any strong competitor, innovation activities in Italcementi mainly concentrated on enhancing internal production processes and bettering products' reliability for general construction uses. There was no formal research and development unit in place and innovation activities took place in the firm's technical support centre that saw to addressing the technical problems identified by customers. By 1991, with the wave of globalization sweeping the cement industry and the changes in European Union laws lowering entry barrier to the national markets, Italcementi management acquired Ciments Francias to stay competitive and to demonstrate that the acquisition increased its innovation potential besides creating a larger firm. However the competitiveness in the industry kept increasing as a result of a number of mergers and acquisitions among Italcementi's competitors. As a result, the TX Active project of Italcementi came handy. This project started from the lucrative idea of mixing photo-catalytic elements with traditional cement components to reduce pollution. However despite being Italcementi's idea, the firm lacked knowledge about photo-catalysis. Therefore embarking on the Open Innovation paradigm, Italcementi started to develop formal ties with many Italian universities and research centers leading to significant growth in the power and skills of the internal project managers and number of

research and development personnel with a technical or scientific degree. In the period 1995–2005, innovation projects implemented every year shot up from nearly 7–8 in 1995 to more than 20 in 2004 and 2005. As a result of this increase

**in the number of projects, an increase in the** adoption **of** **316**

ICT systems was also seen to manage better cross-functional teams separated geographically and for searching in database of scientific publications and patents (Chiaroni, Chiesa, & Frattini, 2011).

**However, despite such successful examples of Open Innovation adoption and all other benefits discussed above, operating in the Open Innovation paradigm can pose many challenges. Those challenges** **1**

are highlighted in the next section. 2.1.5 Challenges to Open Innovation Being a part of the Open Innovation paradigm and reaping its benefits in case of organizational collaborations or alliances does not seem to be easy. Many barriers- such as lack of resources, free-riding behaviour, and problems with contracts - exist in the way of effective collaboration between firms (Hoffmann & Schlosser, 2001; Mohr & Spekman, 1994). Open Innovation therefore requires an over-all organizational fit between the partners, absence of which can derail the whole intent of any such collaboration. Needless to say that this Open Innovation process first involves compatibility in terms of nature of business. But beyond the nature of business, many other important factors may impact the success of any collaboration for Open Innovation. Open Innovation first entails many organizational changes. The capacity of a firm to align with value-added partners

**enhances tangible value and responsiveness to the changing needs of the customers (Ulrich & Smallwood, 2004).** **1**

But at the same time, joining hand with the external players leads to some degree of complexity relating to culture, organizational personality, and trust. Thus the success of a collaboration and the execution and implementation of the alliance strategy relies on leading human, information, and organizational capital that is external to the organizational structure. Therefore, since Open Innovation involves profound organizational change in the firm that intends to abide by it principles, Chiaroni

**et al. (2011)** contend that **the** implementation **of Open Innovation** **467**

takes place in a multi-phase organizational change process. Drawing on the work of Lewin (1947) on organizational change, Chiaroni et al. (2011) show that the implementation of the

**Open Innovation paradigm** takes place **along a three-phase process that** include **the stages of unfreezing, moving and institutionalising.** **225**

The first phase, unfreezing refers to creating a sense of urgency for change in the organization and the formulation and conveyance of the new vision to the firm's internal and external stakeholders like suppliers, customers, personnel, senior management, etc. The second stage, moving implies to the on-ground implementation of the changes. This is done by formulating new procedures and patterns which are aligned with the new vision, eventually acting on budget constraints, schedules, targets, and reward systems. Finally, the third stage deals with institutionalising the new order, by consolidating the improvements achieved in the previous stage and ensuring the organization does not go back to the antecedent status quo (Chiaroni et al., 2011). Besides suggesting that Open Innovation as an organizational change process happens sequentially from unfreezing to moving to institutionalising, Chiaroni et al. (2011) also identify four managerial levers that are important for Open Innovation to take place. They are:

networks, organizational structures, evaluation processes and knowledge management systems. 41

The study shows that the implementation of Open Innovation as a process begins in the organizational structures lever. The study further shows that the firms' network of customers and suppliers play a marginal role at least in the first phase of the process. Individual social networks are also pivotal in the implementation of Open Innovation while a deep change takes place in the processes and evaluation metrics. The study by Chiaroni et al (2011) is one of the few studies that case-studies Open Innovation in a non-high-tech, asset-intensive and relatively low-tech firm, Italcementi, the Italian cement manufacturer, explaining the phases the firm passed through during 18 years to shift from closed to Open Innovation. Chesbrough and Crowther (2006) in their study of non-hi-tech industries identify two more challenges that firms face. The first challenges relates to the not-invented-here (NIH) syndrome.

Katz and Allen (1982) also found the NIH syndrome as a main barrier to external knowledge acquisition. Chesbrough and 252

Crowther's (2006) study found that the surveyed firms overcame this challenge by making clear the

growth gap and stating why reliance on internal efforts was insufficient to meet the organizational objectives. 89

The second challenge identified relates to sustaining internal commitment to the concepts of Open Innovation overtime. The study found that this challenge was overcome by the surveyed firms by ensuring

senior management support and funding at the start of the project, by creating Open Innovation champions that handle the processes that incorporate the technologies in the business, and rethinking internal processes, metrics, and award systems to encourage adoption. 89

De Jong et al. (2007) investigated Open Innovation practices in Dutch SMEs and found that barriers related to open inovation adoption were

related to the organizational and cultural 4

differences, administrative burdens, financing issues and knowledge transfer problems when cooperating with other partners. In line with this, Boschma (2005) highlighted

forms of proximity that are important for effective collaboration, which include cognitive, organizational, cultural and institutional differences between 4

the collaborating players. This implies that

insufficient knowledge, cultures or modes of organization, or bureaucratic elements 4

may cause problems in collaborations

**(van de Vrande et al., 2009).** Furthermore, managing **Open Innovation** 111

also poses considerable challenges. Should external innovators be organized as collaborative community or competitive market? Boudreau et al (2009) identify three issues that managers need to consider when making a decision on question of whether to deal with external innovators as collaborative community or competitors: a) the type of innovation that a firm seeks to shift to the external innovators, b) the motivations of the individuals

**involved in the process of innovation, and** c) **the** 455

nature of the platform business model. The authors mention that communities which operate with intrinsic motivations are useful if an innovation problem involves cumulative knowledge which continually builds on past progress. However, in case

**an innovation problem is best** solved **by broad experimentation,** 428

competitive markets which operate on extrinsic motivations are efficacious. The authors also state that companies might also use nested strategy which is a mixed strategy involving both communities and markets to solve innovation problems. Moreover, the collaboration efforts of firms many times yield positive results, but failures have also been reported (Duysters, Heimeriks, & Jurriëns, 2004). Despite the success of many strategic alliances (e.g. Apple-Clearwell; Hewlett-Packard-Disney; Starbucks-Barnes and Nobles), Das et al (2000) report that, alliance performance has remained weak. Strategic alliances can face difficulties which may often lead to unsatisfactory firm performance (Larsson, Bengtsson, Henriksson, & Sparks, 1998). Open Innovation may involve multi-faceted problems. Open Innovation involves substantial transaction costs due to the evaluation of external partners and infact it may be hard to get access to external partners (Chesbrough, 2003a; Omta & Van Rossum, 1999). According to Keupp and Gassmann (2009), Open Innovation also entails intellectual property considerations which may hinder its implementation. Embarking on an Open Innovation paradigm also involves many managerial challenges in implementation as deeply ingrained mindsets need to be changed (Chesbrough, 2003a). Supplier integration may be sabotaged by inter-company communication, cross-functional team difficulties, design responsibility, tier structure, and alignment. A collaboration effort may also be marred by sharing proprietary information and cultural mismatches (Ragatz et al., 2002). Open Innovation can also lead to a firm's resources being exploited by another firm given that intellectual property rights are hard to protect and benefits from innovations difficult to appropriate (Dahlander & Gann, 2010). In an alliance, a firm may also face issues regarding protecting themselves from the opportunistic behaviour of the partners to keep their core proprietary assets and leakage of critical know-how and information (Hamel, 1991; Kale, Singh, & Perlmutter, 2000). In collaborations in general the partnering players, contribute capabilities that are superior to those available internally and craft agreements that protect them against partner opportunism (Hennart & Zeng, 2005). These concerns can be addressed by having a commitment to open relationships with partnering firms, shared team vision, and downstream coordination (Koufteros, Vonderembse, & Jayaram, 2005). Besides, since

**not all** alliance **partners are equally adept at learning,** the **asymmetries in learning alter the relative bargaining power of partners** 195

(Hamel, 1991). Realising the benefits of capturing and internalizing knowledge from alliance partners needs the discipline of developing an alliance learning capability (Grant & Baden Fuller, 2004). To derive the maximum benefit out of a collaboration, partners must learn to collaborate, integrate, and internalize knowledge rather than acquiring knowledge (Grant & Baden Fuller, 2004). In case of project partnering there

could be many problems, however, there must be

> **clear procedures for resolving disputes** effectively **in a timely manner** 375

(Doz & Hamel, 1998; Love et al., 2002). It is important to build trust to create such an environment and improve information sharing between the partners. However, the good news is that as partnerships mature, trust among knowledge agents builds from people pulling in the same direction (Taylor, 2005). While embarking on the Open Innovation paradigm, firms need to assess their position with reference to these challenges and according position themselves in order to enhance the Open Innovation outcomes. It is however believed that some of the challenges discussed above can be overcome if employees in an organization practise proper citizenship behaviours. The next section discusses the literature related to such Organizational Citizenship Behaviours. 2.2 Organizational Citizenship Behaviours (OCB) 2.2.1 Definition of OCB Organizational Citizenship Behaviours (OCBs), a term slightly less than 30 years old, has been the subject matter of numerous studies since it was introduced by Dennis W. Organ during the 42 nd National Academy of Management meeting in 1982 in New York.

> **One of the most widely studied topics in organizational** behaviour **research in recent years** 265

(Podsakoff & MacKenzie, 1997), a look at the related literature of the construct suggests that it is a complex phenomenon involving a lot of tacit elements. The concept of OCBs however is emerging as an important aspect of employee behaviour at work. Organizational Citizenship Behaviours are defined as

> **discretionary, extra-role** behaviours **of employees which** exceed **the prescribed formal roles, and are** 17

> **not directly or** clearly demanded **by the formal** award **system (Organ, 1988).** 121

Positive employee voluntary behaviours like acting cooperatively, being a team player,

> **suggesting ways to improve the product, and promoting a positive climate,** 83

which Organ termed as OCBs are shown by the activities that are aimed

> **toward other** employees **in the** office **or** in **the organization. These** activities can **include helping co-workers,** 59

being conscientious toward the work environment, communicating new and critical information, actively taking part

> **in decision processes and discussions, and** not **complaining about minor** 83

issues (Yen et al., 2008). Organizational Citizenship Behaviours performed by the employees of a firm exceed the minimum job requirements as anticipated by the employer and advance the well- being of the

co-workers, the organization or the work groups. At the same time, organizations rely on the employees' practice of OCBs so as to encourage a positive work atmosphere, to assist other employees with any problems, be more tolerable of any inconveniences, and protect resources of the firm (Witt, 1991). Three main types of behaviours are required for high organizational effectiveness: one, people must join and remain in the organization (employee retention rate); two, employees must stick to the in-role behaviour which is performed as per the

> **formal role descriptions; and** three, **extra-role** behaviour which goes **beyond** the **formal requirements** 17

of the role must be practiced (Katz & Kahn, 1978). The in-role behaviour expected of an employee is usually codified in job description or role requirement. However, for increased organizational effectiveness, the employees must also practice the extra-role and engage in cooperative behaviour which goes beyond what is stated in their role descriptions. OCB is a term used to describe such extra-role and employee cooperation. Notwithstanding, this explanation, it often becomes difficult to make a distinction between the in-role requirement and OCBs. Morrison (1994) showed that employees differ in their perception of in-role and extra-role behaviour. While some employees may think of a given behaviour as an OCB, others with broader view may consider the same as in-role behaviour. The

> **boundary between in-role and extra-role** behaviour thus is **not clearly defined and** 12

that OCB emerges as a function of how broadly employees define their job responsibilities. The

> **impact of** OCBs **on the performance of the firm** 381

accordingly varies. 2.2.2 Characteristics of OCB In a rather influential book,

> **Organizational Citizenship** Behaviours: **The good soldier syndrome (1988), Organ** 17

argues that good citizenship behaviour is characterized by traits of Altruism, Conscientiousness, Sportsmanship, and Courtesy among the employees. Organ however recognizes that in isolation any one instance of OCBs may be insignificant, but in the aggregate this discretionary behaviour has a major beneficial impact on organizational operations and effectiveness. Later in 1997, Organ acknowledged the conceptual difficulties and ambiguities associated with OCB being discretionary and unrewarded (Motowidlo, 2000) and re-defined it

> **as "performance that supports the social and psychological environment in which task performance takes place" (Organ, 1997). The** 102

> **pioneering researchers of OCBs emphasized that OCBs should be viewed as extra- role and organizationally functional and separate from in-role job performance (Bateman & Organ, 1983; Smith, Organ, & Near, 1983).** 1

This, according to Graham (1994) created the difficulty of determining

**what is in-role and what is extra-role.** 147

To remove this difficulty, Graham proposed a second approach based on research of civic citizenship in philosophy, political science, and social history arguing that organizational citizenship

**can be** conceived **as a global concept,** involving **all positive organizationally relevant behaviours of employees. This conceptualization of organizational citizenship thus encompasses the traditional in-role job performance behaviours, organizationally functional extra-role behaviours, and political behaviours, such as full and responsible organizational participation.** 1

Several nomenclature have been used to describe extra-role behaviour

**such as Organizational Citizenship** Behaviours **(Bateman & Organ, 1983;** Graham, 1991; **Organ, 1988;** 355

Schnake, 1991;

**Smith et al., 1983),** civic **organizational** behaviour **(Graham,** 274

1991), contextual performance (Borman & Motowidlo, 1997b), pro-social

**organizational behaviour (Brief & Motowidlo, 1986), organizational spontaneity (George & Brief, 1992),** counter **role** 294

behaviour (Staw & Boettger, 1990) and contextual performance (Borman & Motowidlo, 1997a). Notwithstanding this diverse vocabulary, all of these concepts aim at identifying a work behaviour among employees that leads to organizational effectiveness (Dyne et al., 1994). The next section discusses the dimensions of OCBs as discussed in most of the literature on this concept. 2.2.3 Dimensions of OCB While OCB has been given several nomenclatures as stated above, it has also been variously dimensionalized and operationalised.

**Smith et al. (1983)** proposed **`Altruism' and `generalized compliance' as the** components **of OCB.** 277

In 1988, Organ

**proposed Altruism, Conscientiousness, Courtesy, Civic Virtue, and Sportsmanship as** the five **dimensions** 17

of OCB (Organ, 1988). Dyne et al (1994a) proposed

**interpersonal helping, organizational loyalty, organizational** obedience, and organizational **participation** as **the** 17

OCB dimensions. Podsakoff et al (1994) proposed helping behaviours,

> **Sportsmanship and Civic Virtue** as the **dimensions of** OCBs. However **the** dimensions of **OCB** 448

as proposed by Organ (1988) have become widely accepted as they encompass

> **the constructs on extra-role** behaviour **or voluntary** behaviour **proposed in previous studies** 17

(Yoon, 2009). There are numerous studies on OCBs that have used the OCB dimensions as proposed by Organ (1988). The five dimensions are: 1. Altruism: It refers to voluntary behaviours. It is displayed when one member of the organization helps the other

> **in completing his/her** work **under unusual circumstances (Organ,** 17

1988). For instance, being helpful, cooperative,

> **and other instances of extra-role behaviour, which** help **a specific individual with a given work related problem (Podsakoff**& Philip, **1990).** 20

2. Conscientiousness: It refers to how much

> **someone is punctual, high in attendance and** exceeds **normal requirements or expectations.** 20

> **In other words, it** refers **to a member of** an **organization** 207

performing his/her tasks (in-role behaviour) beyond expectation (Podsakoff & Philip, 1990). 3. Sportsmanship: It refers to emphasizing more the positive aspects of an organization rather than the negative ones. In other words, Sportsmanship describes the employees who tolerate the inevitable irritants at the workplace and exhibit

> **behaviours that** show **tolerance of less than ideal** work **conditions without complaining (Podsakoff**& Philip, **1990).** 20

Sportsmanship

> **refers to** maintaining **a positive attitude** by employees **even when things go wrong** 83

or when there are minor setbacks, and their willingness to give up personal interests for the good of the organization by, for example,

> **not complaining about trivial matters** or **not finding fault with other**

**employees.** 134

4. Courtesy: It refers to behaviours that are aimed at preventing future problems. This dimension is different from Altruism in the sense that Altruism involves helping someone with a problem, while Courtesy involves assisting in preventing the problems and

**performing thoughtful or considerate gestures towards others (Podsakoff**& Philip, **1990).** 20

In the words of Organ (1988),

**Courtesy includes** behaviour **such as "helping someone prevents a problem from occurring, or taking steps in advance to mitigate the problem".** 17

5. Civic Virtue: It involves supporting the administrative functions of the firm. It relates to the employee behaviours that deal

**with the political life of the** organization **(e.g., engage in policy debates,** attend meetings, **and express one's opinions in implementing a new policy).** 20

**Derived from Graham's** (1991) **concept of** organizational **"citizens"** 59

who are willing

**to participate actively in organizational governance and monitor the environment for possible threats and opportunities even at personal cost,** 59

Civic Virtue refers to employees' commitment to the organization as a whole (Ackfeldt & Coote, 2005; Yen et al., 2008). The OCB framework by Organ (1988) encompassing the five dimensions highlighted above is the only one that has been treated consistently over a fairly large number of studies (LePine, Erez, & Johnson, 2002). However, Podsakoff and Philip (1990)

**revealed that Altruism is highly correlated with Courtesy (r=0.86),** implying **that** 3

using

**one of the dimensions is sufficient to describe both of them.** 3

Besides, LePine et al. (2002) found overlapping of Sportsmanship and Civic Virtue. The relevance of this to the current study is discussed in Chapter 3. The next section discusses how these dimensions of OCBs affect a firm and its performance. 2.2.4 OCB and Firm Performance Organizational Citizenship Behaviours are known to contribute to organizational performance (Organ, Podsakoff, & MacKenzie, 2005).

**Several studies have** studied **the relationship between** different elements of **Organizational Citizenship** Behaviours **and** organizational **performance. The** 180

positive contribution that OCBs make toward business

**performance is** well **accepted** in **the literature (Podsakoff & MacKenzie,** 1997; **Podsakoff** 250

& Mackenzie, 1994). Organizational Citizenship Behaviours can

**contribute to organizational performance** as **these** behaviours **provide an effective means of managing the interdependencies between members of a work unit and** resultantly **increase the collective outcomes achieved.** 137

OCBs also enhance organizational performance in that practicing the dimension of OCBs

**lubricate the social machinery of the** organization, reducing **friction, and** increasing **efficiency (Bateman & Organ, 1983; Smith** et al., **1983).** 20

OCBs may also lower the requirement of firms to dedicate

**scarce resources to maintenance functions.** Fewer **resources** 46

devoted to

**maintenance means more resources** available **for immediately productive purposes.** 46

**(Organ, 1988; Smith et al., 1983).** 274

Wright

**et al (2003) found a** significant **relationship between** organizational **commitment** (a dimension **of** OCB) **and** 324

**operational measures of performance, operating expenses and pre-tax profits.** 319

Another unit-level, longitudinal study about the effects of OCBs on organizational effectiveness involving 774 employees and 64 managers

| | |
|---|---|
| from the units of a regional restaurant chain | 131 |

suggested through a

| | |
|---|---|
| cross-lagged regression analysis that employee attitudes and behaviours at Time 1 are related to organizational effectiveness at Time 2 | 131 |

(Koys, 2001). In yet another study on the effects of OCBs in a paper mill in the North-eastern United States, results

| | |
|---|---|
| showed that there was a significant relationship between helping behaviour and | 328 |

Sportsmanship on one hand and performance quantity on the other. The results of the same study also indicated that helping behaviour significantly impacted performance quality (Podsakoff, Ahearne, & MacKenzie, 1997). The results of a recently published article that

| | |
|---|---|
| meta-analytically reviewed 38 independent samples (N=3,097) | 242 |

suggests

| | |
|---|---|
| a positive overall relationship between OCBs and performance | 242 |

(Nielsen, Hrivnak, & Shaw, 2009). The results of a review of the available empirical evidence on OCBs and organizational performance indicate that OCBs significantly influence organizational effectiveness (Podsakoff & MacKenzie, 1997). Besides several other studies also consider OCB as a means of positively impacting a firm's performance (Dunlop & Lee, 2003; Ehrhart, Bliese, & Thomas, 2006). The constraints of space may not allow to discuss all such studies here, however many more studies establish a positive relation between OCB and superior performance (e.g. Podsakoff, Whiting, Podsakoff, & Blume, 2009; Yen et al., 2008). Besides impacting performance of a firm, OCBs also have implication on the managerial evaluation of the employees. Although Organizational Citizenship Behaviours are not easily enforceable by the threat of sanctions because they extend beyond formal role requirements (Smith et al., 1983),

| | |
|---|---|
| managers may give better evaluations to employees who perform OCBs because this may help the | 46 |

managers to focus on and devote

| | |
|---|---|
| their time to more important activities like planning, scheduling, problem solving, and organizational analysis | 46 |

| | |
|---|---|
| that enhance the manager's personal effectiveness. | 46 |

For instance, an experienced employee assisting

**a newly-hired employee** acclimatize **to his job may** 46

improve performance of the manager and thus become 'distinctive' for evaluation in the eyes of the manager (Organ, 1988; Posdakoff & MacKenzie, 1994). Many studies indicate that managers do consider OCB while evaluating their sub-ordinates (Avila, Fern, & Mann, 1988; Borman & Motowidlo, 1997b; Krilowicz & Lowery, 1996; MacKenzie, Podsakoff, & Fetter, 1991). In contrast to the above findings, however a careful look at the emerging literature suggests that there is a positive as well as negative relationship

**between OCBs and** various **measures of individual and organizational performance** 134

(Ackfeldt & Coote, 2005). While (Posdakoff & MacKenzie, 1994) found positive relationships

**between Civic Virtue and Sportsmanship and** 134

unit performance, another dimension of OCB, Helping Behaviour,

**was found to have a significant negative** impact **on unit performance** 322

(standardized y 1,1 = -.494). Moreover, (Barksdale & Werner, 2001) found no relationship between yet another important dimension of OCB, Conscientiousness and employee performance. Hence in view of the above, while overwhelming evidence suggests positive impact of OCBs on performance, some studies disagree with this too. The next section discusses how OCBs relate to Open Innovation 2.2.5 OCB and Open Innovation

**While the link between OCBs and business performance has been discussed both conceptually and supported by empirical evidence as shown above, some studies have also shown relationship between innovative performance of a firm and OCBs (Ishak, 2005). However, most of the research about Open Innovation has either been exploratory and qualitative in nature or very anecdotal. Of late, in the European context, quantitative studies based on surveys have started coming up. But even then, there seems to be no study to the best of** this researcher's **knowledge that answers how OCBs impact Open Innovation. According to Jex (2002), employee innovations in organizations in the form of new products and services have always been quite visible. In the organizational innovation literature, some researchers have focused on the process by which employees generate innovative ideas, while others have devoted their time to identifying characteristics of highly innovative employees. In either case the focus has been employees (Jex, 2002).** 1

This has however been stated about the closed innovation paradigm which assumes reliance on internal research and development only. Similarly the effect of OCBs on business performance has also been studied and found to be significant in closed innovation paradigm only.

**There seems to be no study that investigates the relationship** 1

between OCBs and business performance as measured in terms of Open Innovation – a paradigm that assumes using both internal research and development and external collaborations to fuel innovation. Given the recency of Open Innovation, this study finds it difficult to find any specific literature on the relation between Open Innovation and OCBs. However a positive relation is expected between these two variables and this statement is made based on the following two grounds: first, shifting from a closed innovation paradigm to an Open Innovation paradigm may entail scarcity or unpreparedness of resources or teething problems. Managers cannot foresee all uncertain events or fully expect the activities that they may desire or need employees to perform (Katz & Kahn, 1978; Organ, 1988). Hence the employees who

do more than they are expected to do by performing spontaneous behaviours

are especially valued by the management (Ishak, 2005). Therefore, OCBs shown by the employees may go a long way in ensuring success of the Open Innovation projects as they may help their firms overcome infancy-stage related issues, solving which could be crucial in determining ultimate outcome of Open Innovation efforts. Second, research has shown a positive relation between OCBs and organizational performance as measured in the (closed) innovation paradigm (Jomo, Sundaram, Felker, & Rasiah, 1999). It is thus likely in the case of Open Innovation also as by and large the objectives of Open Innovation and closed innovation remain the same in that both paradigms aim at product and process innovations - only difference being that the methods of coming up with such innovations vary. Hence based on the discussion in above sections, the following hypotheses are developed: 1

H1a:

There is a positive relationship between Altruism and In-bound Open Innovation 8

in that Altruism facilitates In-bound Open Innovation. H1b:

There is a positive relationship between Altruism and Out-bound Open Innovation 8

in that Altruism facilitates Out-bound Open Innovation. H2a:

There is a positive relationship between Conscientiousness and In-bound Open Innovation 8

in that Conscientiousness facilitates In-bound Open Innovation. H2b:

**There is a positive relationship between** Conscientiousness **and** Out-bound Open **Innovation** 8

in that Conscientiousness facilitates Out-bound Open Innovation. H3a:

**There is a positive relationship between** Sportsmanship **and** In-bound Open **Innovation** 8

in that Sportsmanship facilitates In-bound Open Innovation. H3b:

**There is a positive relationship between** Sportsmanship **and** Out-bound Open **Innovation** 8

in that Sportsmanship facilitates Out-bound Open Innovation. The next section discusses related literature on the second predictor variable in this study, Managerial Ties. Like OCBs, Managerial Ties are also expected to impact Open Innovation outcomes for a variety of reasons which are discussed in later sections. 2.3 Managerial Ties 2.3.1 Definition of

**Managerial Ties Managerial Ties are** defined as "executives' boundary-spanning activities and their associated interactions with external entities" **(Geletkanycz & Hambrick, 1997).** Managerial Ties **form a part of social capital or social exchange. Social capital, according to Adler and Kwon (2002) is**"roughly understood as the goodwill that is engendered by the fabric of social relations and that can be mobilized to facilitate action". **Social capital** 1

explains well

**actors' relative success in** different **organizational** settings. **Adler and Kwon (2002) cite a number of studies showing the effect of social capital** on **career success,** 1

executive compensation, job search, in obtaining better recruits for organizations, facilitating inter-unit exchange of resources and product innovation, creating, cross-functional team effectiveness, reducing turnover, intellectual capital and organizational dissolution rates, facilitating entrepreneurship, helping in launching start-up companies, strengthening supplier relations, regional production networks and improving inter-firm learning.

**To succeed, particularly in a transition economy developing ties with business leaders and government officials** can be vital **as** 1

relationship with an influential contact can often be more useful than even the capabilities of a firm (Tsang, 1998; Xin & Pearce, 1996). Ties of managers may thus work wonders for a manager and the firm employing such a manager. However, social exchange involves exchanging gifts and favors among individuals without specified reciprocal obligations. This can lead to several problems which are discussed later. A rough equivalent of Managerial Ties (somewhat similar to

**blat in Russia, pratik in Haiti and** compadre **in** 198

Latin America) in the Chinese language is guanxi. Guanxi, as social capital comes to be called in the Chinese context has been the focus of numerous studies on social relationships and social capital. Though many times considered equivalent to networking in the western literature, guanxi is different because unlike networking, guanxi is not primarily associated with commercially based corporate-to- corporate relations (Luo & Chen, 1997). Guanxi relates to personal relations and

**exchanges that take place amongst members of the guanxi network** 109
which **are not** only **commercial, but also social. The**

next section discusses the dimension of Managerial Ties as explored in the literature. 2.3.2 Dimensions of Managerial Ties Li and Zhang (2007) divide Managerial Ties along two dimensions: attribute of the ties (whether business ties and support

**ties) and geographical boundaries of the ties** 38

(whether cluster ties and non-cluster ties). As a result of this classification,

**there are four types of Managerial Ties.** 38

Along the attributes dimension, managers

**cultivate business ties with** managers **at other firms such as suppliers, competitors** 38

etc. In contrast, managers cultivate support

**ties with supportive institutions such as government and business associations.** On **the** 38

other hand, along the geographical boundary dimension, managers cultivate

**ties within a cluster** or **beyond a cluster.** 38

Li and Zhang (2007) found that within a cluster,

**there is a significant and positive correlation between** sales growth 312
**and** ties with executives **of**

suppliers, ties with executive among buyers, government officials, business associations while, beyond a cluster, a significant relationship was also found between sales growth and ties with executives among buyers. Luo and Chen (1997) explored Managerial Ties in China and state that two types of Managerial Ties can be found in China: one, the ties

**with managers at other firms such as suppliers, buyers and** even 237

**competitors;** two, **the** ties **with government officials.**

While

**ties with managers at other firms** bring value **to** 9

the firm Li and Zhou (2010), Peng and Luo (2000) found that in a transition economy, closer ties of managers with government officials help a firm get institutional support like favorable interpreting of regulations, settling negotiations, enforcing contracts, or even erecting barriers to new entry. Establishing ties with government officials can make it easier for firms to procure scarce resource such as human resources and access to capital land (Li & Zhou, 2010). However, besides

**ties with managers at other firms and ties with government officials,** 52

managers also forge ties with researchers in

**universities and** other **research centers.** Currently universities **around the world** are **mainly** 447

financed by public money, but this funding is expected to decrease. Gassmann, Enkel, and Chesbrough (2010) reveal that big

**companies like ABB,** Siemens, **Daimler and GE have already** slashed down **their** in-house **research activities** 41

which will further increase collaboration between the innovation players. In this regard, the

**alliance between IBM and the ETH Zurich in Switzerland on research into nanotechnology** 41

allows both the partners

**right to publish and commercialize the jointly created intellectual property** 304

(Gassmann

**et al., 2010). Laursen and Salter** (2005) studied **the** sources **of** 111

knowledge for innovation activities in UK manufacturing firms using a sample of more than 2300 firms across 13 different broad industries and found “universities or higher education institutes” as the highest used sources of knowledge among the institutional sources of knowledge. Another study by the same authors, Laursen and Salter (2004) found that firms have a higher probability of considering university knowledge while searching for external knowledge sources. Hence the

**role played by university-industry linkages in** spurring **R&D activities in firms** 269

is well documented (Rasiah & Govindaraju, 2009). Success in adopting the Open Innovation paradigm as mentioned before is contingent upon a

> **firm's ability to identify, assimilate and exploit** the external **knowledge sources.** 311

Knowledge created in universities has traditionally contributed to the knowledge of firms. However, seeking out and using this knowledge effectively requires firms to establish collaborative networks with external scientists (Fabrizio, 2006). Given the benefits it offers in stimulating R&D activities in firms, the university-industry collaboration has been in place for a long time. Such ties therefore between R&D centers and firms are vital in enhancing the output of Open Innovation. 2.3.3 Advantages of Managerial Ties The benefits of Managerial Ties are many, both for the individuals and the businesses. Managers reputed for trust and the ones with good relationships are in a better position to procure

> **resources for themselves, their** firms **and their friends and family.** 96

Such managers provide more efficiency as they can bypass certain procedures and processes, get expedient approvals and receipt of permits. They also get bonuses, kickbacks from sales, stocks or options, commissions, promotions, new job offers, better career advancement opportunities, lure finances both

> **from domestic and foreign sources and** 96

win government projects, build customer networks quickly and develop efficient market channels. Managerial Ties can also help in exchanging

> **information such as trade secrets,** news, **competitor information** 96

and enable

> **access to new technology and innovation.** 96

Managerial Ties benefit the managers as enterprises prefer candidates with wide relationships with government, other institutions and customers. Employing such managers makes it easy for the firms to get favorable policies, changes in laws, access to unobtainable or scarce resources like land, loans, preferential

> **treatment in** selling **and** purchasing **for day-to-day operations** 96

and so on (Adler & Kwon, 2002). Chung (2006) studied the deregulated banking industry in Taiwan and found that in case a business group does not have

> **previous experience in the deregulation process, Managerial Ties** 43

give a clear advantage by providing

> **valuable information and tangible benefits** in acquiring **approval licenses** 43

and making a decision to seek such a license. On the basis of secondary data they concluded that Managerial Ties possessed by key individuals in

> **a business group** influence **decision to enter the deregulated banking industry. The** role **of** — 43

Managerial Ties becomes more important in uncertain times and in transition economies which are less regulated and lack market supporting institutions like clear laws and regulations (Peng & Luo, 2000). A look at the related literature reveals that a lot of work on Managerial Ties has been done in emerging economies where uncertainty is higher. In case of

> **emerging economies, the rules for market competition remain less predictable and less clear** — 34

as compared to many

> **Western economies,** since **the formal institutions that support free markets** — 34

> **are still** evolving **(Hoskisson, Eden, Lau, & Wright, 2000). In** — 386

case of weak institutional support and information distortion typical of imperfect competition, the social capital embedded in Managerial Ties becomes important whereby a well-connected manager exhibits entrepreneurial spirit and adds value by networking with others (Burt, 1997a; Peng & Luo, 2000). Such social capital is not only valuable but rare and

> **an intangible resource** which becomes **difficult to** imitate, **thus giving** firms **possessing such ties a significant advantage** — 258

against competitors (Tsang, 1998). Nevertheless, institutional support is less likely to exist in a developed country where advantages are

> **largely based on** some **intangible assets (e.g., technological capabilities, organizational skills)** — 293

and where the government has a less direct and involved role (Sim & Pandian, 2003). In spite of these advantages of Managerial Ties, there are some disadvantages as well

> **which are discussed in the following** section. **2.** 3 **.4** — 26

Disadvantages of Managerial Ties Although Managerial Ties (guanxi in Chinese) can be beneficial for a firm, there could be some negative implications also as Managerial Ties may involve some undefined and unspecified obligations. In their review of concepts related to

> **social exchange** and **social capital** in literature, **Adler and Kwon (2002)** — 1

highlight the benefits and risks of such exchanges for primary and other related actors. The risks of Managerial Ties include investing more in a relationship than it is worthy of; sometimes Managerial Ties may create value for the primary actor but prove to be inimical to the aggregate; Managerial Ties may limit action because of the obligations associated with the relationship. Managerial Ties may also be harmful to individuals and businesses. Managerial Ties can lead to payment of bribes (cash and kind), unethical gratification, smuggling, distraction from duties, present conflicting responsibilities, lower ethical standards, low work efficiency, low morale, affect negotiations and economic outcomes in a negotiation negatively, lead to recruiting unsuitable employees, buying of low quality products and service, unfair competition, monopolies, low economic efficiency, may hinder development of legal and economic systems, undermine meritocracy, resource ownership and allocation problems, imperiled public health and safety, poor decision making and even result in unwillingness to initiate action and loss of ambition for the managers who are talented but with no access to exchanges (Tenbrunsel, Wade- Benzoni, Moag, & Bazerman, 1999; Warren, Dunfee, & Li, 2004). In addition, sustaining competitive advantage gained as a result of Managerial Ties might not be easily sustainable as the benefits accrued from Managerial Ties can be affected by even something as simple as staff mobility (Tsang, 1998). Given these disadvantages of Managerial Ties, it becomes interesting to know how Managerial Ties impact firm performance. The section thus looks at this relationship between Managerial Ties and firm performance. 2.3.5 Managerial Ties and Firm Performance Managerial Ties have been found to impact organizational performance both conceptually and empirically (Batjargal, 2003; Granovetter, 1985; Luo & Chen, 1997; Peng & Luo, 2000; Xin & Pearce, 1996). In addition, Luo and Chen (1997) found empirically that the Managerial Ties

> **have a positive** and deep **influence on the** efficiency and **growth of** a firm 2 . **The** **337**

social network theory states that the managers who have superior interpersonal connections tend to receive more income, get promoted 2 Luo & Chen (1997) use the Chinese word guanxi which refers

> **to the concept of drawing on connections or networks to secure favors in personal or business relations.** **211**

more often, and have better careers (Granovetter, 1985). This implies that firms value Managerial Ties and reward such interpersonal connections. In transition economies due to the lack of market supporting institutions, managers are often required to perform even basic functions like getting market information, understanding regulations and enforcing contracts (Khanna & Palepu, 1997). In view of this, ties of managers can play a crucial part in easing economic exchanges and hence improve firm performance (Peng & Heath, 1996). Li and Zhou (2010) studied the effect of Managerial Ties on competitive advantage and found that

> **Managerial Ties improve** firm **performance** by providing **an institutional advantage in** **254**

terms of

> **securing scarce resources and** obtaining **institutional support.** **254**

The key path to get an institutional advantage is to establish

> **ties with government officials and managers at other firms.** **61**

This institutional advantage enhances differentiation and cost advantages, finally leading to better performance. Geletkanycz and Hambrick (1997) studied the effect of Managerial Ties on

**organizational strategy and performance** and found **that the** 112

intra-industry Managerial Ties of executives were related to strategic conformity while the extra-industry ties were related to the

**adoption of deviant strategies, and that** matching the **executives' external** relations **with the informational** needs **of the firm's strategy** improves **performance** 112

of the organization. This study later became one of the most definitive studies examining the significance of boundary spanning ties of the executives

**on firm- level outcomes of strategy and performance.** 112

Also most of the literature defines Managerial Ties in accordance with the definition as posited in this study. Peng and Zhou (2005) state that firms' and their managers' dense networks of ties with dominant institutions help them to cash in on economies of scale based on their social relations.

**Peng and Luo (2000)** studied **Managerial Ties and firm performance in** China's **transition economy** 157

and empirically concluded that managers'

**ties with managers at other firms and with government officials** 61

affect

**firm performance measured in terms of** market share **and return on assets** 187

(ROA). They however found

**that Managerial Ties were necessary but** not sufficient **for good** firm **performance** because **a number of strategy** variable **also** affected **performance** 109

of firms. Based on a survey in China in 1996-1997, they further argued that ties

**with government officials** were **more important than ties with managers at other firms.** However, **in** 38

contrast to Peng and Luo (2000), Zhu and He (2010) in their empirical study found that Managerial Ties do not directly influence organizational performance and that this relationship is mediated by another variable called sense-making which is strengthened by Managerial Ties to improve firm performance . This is because with the development of market system and maturity of players, market rules such as good product quality matter more than managerial relationships. The same study also revealed that

> **Managerial Ties with government officials** help a **firm by** 92

shaping an advantageous environment.

> **Managerial Ties with** market actors **(managers at other firms)** were found **to** 61

have more positive total effect on firms' performance than the ties with non-market actors (government officials). Hence this finding is in sharp contrast to

> **Peng and Luo (2000)** who **found ties with government officials to** 92

be more important than ties with managers at other firms. Given this discussion about whether or not Managerial Ties affect firm performance and somewhat conflicting results, it appears that Managerial Ties offer value conditionally – this is taken up in the next section. 2.3.6 Conditional value of Managerial Ties

> **Recent developments in** the **social network theory** show **that** Managerial **Ties** may **not always** be useful to **the** 34

firm and that the efficacy of such ties may depend on vital contextual factors (Li, Poppo, & Zhou, 2008). Researchers have investigated such factors that lead to positive or negative implications of Managerial Ties. Li, et al. (2008) examined the

> **three sources of heterogeneity** which can alter **the** usefulness **of** Managerial **Ties: firm ownership (foreign** and **domestic), competition, and structural uncertainty.** 34

They found that despite both

> **foreign and domestic firms** utilizing **ties at a similar level,** 34

there is a positive, monotonic impact of Managerial Ties

> **on performance for domestic firms, whereas** for foreign firms **the effect is curvilinear.** 34

This study also revealed that in case of stiff competition Managerial Ties may not be as efficacious in improving the performance but Managerial Ties lead to better organizational performance in case of high structural uncertainty. To solve the conundrum of whether the

> **foreign firms entering China** should **adopt a differentiation or low-cost position to achieve superior performance** 35

or actively build Managerial Ties in view of the

> market and institutional environments in China, 472

Li et al. (2009) reported that

> both differentiation and low-cost strategies increase profitability of the foreign 35

firm. However it was found

> that the benefits of a differentiation position depended on 35

> political and business ties. Political ties blocked the positive influence of a differentiation position on foreign firms' profitability 257

while business ties did the opposite. The study also showed that foreign firms benefit from ties with businesses while their increasing dependence political ties mars their profitability. Xin and Pearce (1996) tested the argument that weak legal system for private businesses predisposes managers to develop connections in societies and concluded that due to an underdeveloped legal framework,

> private company executives become more dependent on ties than executives of state-owned or collective -hybrid companies 261

(Nee, 1992). It was found that in comparison to executives of state-owned firms, private-company executives depended more on ties for protection, deemed business ties more crucial,

> had more government ties, exchanged more unreciprocated gifts, and trusted their ties more. 157

This is because private structure enjoys less structural support in a transition economy. However, managers' decision to develop ties with government officials comes with both benefits and costs (Warren et al., 2004) as has been discussed in the previous sections. 2.3.7 Managerial Ties and Open Innovation Networking at the firm level can improve competitive advantage of a firm by allowing

> access to resources of members of other networks which can help in entering markets that need a firm's core technologies and competencies (Thorelli, 1986). However, if the aim of networking is creation of innovation, such a process entails several challenges. This is because the participating firms may require entering into relationships with universities and research institutions (Perkmann & Walsh, 2007), suppliers (Emden et al., 2006) and users (von Hippel& Katz, 2002; von Hippel, 2001). The view that embeddedness of firms in networks has important implications in their functioning has assumed added importance in that networks are important particularly for learning and innovation between firms (Gilsing & Nooteboom, 2005). In 1

fact, firms have regarded their managers' ability to establish network of contacts outside the firm as critical for their appointment and subsequent evaluation (Chiaroni et al., 2011). In

> **case of Open Innovation, firms rely on an extensive use of inter-organizational relationships to internalize external ideas from a variety of external innovation sources and to market the ideas that are developed within the firm but fall outside the firm's current business model (Chesbrough, 2006;** Vanhaverbeke, **2006). Such firms** look **for** novel **ideas and technologies by increasing the search breath (the number of** innovation **sources they** depend **upon** 1

for creating innovation) and the search depth (the degree/depth to which firms utilize their external knowledge

> **sources) of their innovation networks (Laursen & Salter, 2006). The purpose of this could either be to use the inter-organizational relationship for explorative or exploitative purpose (March, 1991). However, in the Open Innovation paradigm, given the diversity of partners, the activities of acquisition, assimilation, transformation and exploitation (Zahra & George, 2002) become all the more complex. During exploration, there are good reasons for** establishing many **dense ties** which **are strong in** all **dimensions. During the exploitation process, there are good reasons for** establishing **non-dense ties** which **are strong in** dimensions **other than** those **in networks for exploration (Gilsing & Nooteboom, 2005). This is where the role of well-connected managers and Managerial Ties becomes paramount.** 1

Several case studies stress the importance of

> **informal ties of employees with** the **employees of other organizations** 333

in understanding

> **how new products are created and commercialized (e.g.** Vanhaverbeke, **2006).** 4

Vanhaverbeke (2006) consider external networking - which

> **includes all activities** related **to** acquiring **and** maintaining **connections with external sources of social capital, including individuals and organizations - as** 4

an important and consistently associated dimension of Open Innovation

> **(van de Vrande et al., 2009). The** 111

processes of In-bound and Out-bound Open Innovation, 1

involve a high degree of uncertainty both in terms of exploration for better partners and outcomes of such partnerships. It is here that Managerial Ties can play a crucial role in making right decision about identifying right partners, forging proper partnerships and ensuring their outcomes. Therefore, on the basis of discussion in the above sections, the following hypotheses are developed: H4a: Managerial Ties 1

with Government Officials facilitate In-bound Open Innovation. H4b: Managerial Ties with Government Officials facilitate Out-bound Open Innovation. H5a:

Managerial Ties with Managers at other firms 9

facilitate In-bound Open Innovation. H5b:

Managerial Ties with Managers at other firms 9

facilitate Out-bound Open Innovation. H6a: Managerial

Ties with Universities and/ or other Research Centers 24

facilitate In- bound Open Innovation. H6b: Managerial

Ties with Universities and/ or other Research Centers 24

facilitate Out- bound Open Innovation. 2.4 Organizational Culture 2.4.1 Definition of Organizational Culture The earliest significant formal writing on Organizational Culture can be traced to Pettigrew (1979). Pettigrew (1979) contended that people “create, shape, change and manage the culture according to their beliefs, values, knowledge and needs”. Pettigrew (1979) thus speaks about the

collective nature of Organizational Culture by stating that human beings collectively accept certain things and that they use this collective knowledge 18

to interpret the processes and relationships that evolve in the organization. 18

Since Pettigrew’s (1979) work on Organizational Culture, a large number of studies have piled up, defining and explaining the concept of Organizational Culture in different ways. Not much agreement exists over an exact definition and scope of Organizational Culture (Ogbonna & Harris, 2000; Scott, Mannion, Davies, & Marshall, 2003) and there is no method to conclusively end debates about one true definition or concept

of Organizational Culture (Ott, 1989). Organizational Culture has 39

**been** defined differently **by**

a multitude of scholars (Denison, 1990; Hofstede, Neuijen, Ohayv, & Sanders, 1990; Keesing, 1974; Ott, 1989; Schein, 1990, 1993). However, while many definitions of Organizational Culture exist, one definition has come to be regarded as somewhat like a standard definition. Accordingly, Organizational Culture is defined

**as a set of shared, values, beliefs, assumptions and practices that shape and** guide the **attitude** 249

of members of an

**organization (Davis,** 1990; **Denison, 1990; Kotter & Heskett, 1992; O'Reilly & Chatman, 1996).** 19

Another oft-cited definition of Organizational Culture is by Schein's (2004, p. 17) who

**defined Organizational Culture as:** 2

"a pattern of basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems". Hofstede (1980), who has had tremendous impact on Organizational Culture research referred

**to Organizational Culture as the collective programming of the mind** 314

including shared beliefs, values and practices that distinguish between organizations and members of different organizations. According to Scott et al. (2003), "Organizational Culture refers to a wide range of social phenomena that include an organization's customary dress, language, behavior, beliefs, values, assumptions, symbols of status and authority, myths, ceremonies and rituals, and modes of deference and subversion".

**All** these **help to define an organization's character and norms.** 309

More recently and not in much disagreement with the above definitions,

**Park et al. (2004) defined Organizational Culture as** 431

"the shared, basic assumptions that an organization learns while coping with the environment and solving problems of external adaptation and internal integration that are taught to new employees as the correct way to solve those problems". Getting more complex, Detert et al. (2000) remarked

**that Organizational Culture is holistic, historically determined, and socially constructed, and involves beliefs and** behaviours and **exists at a variety of levels and manifests itself in a wide range of features of organizational life.** 107

In line with these definitions, researchers broadly agree that culture can be regarded

> **as a set of cognitions shared by members of a social unit** 278

(Hause, 2000). This study uses the definition of Organizational Culture as given by Schien (1992). This definition, quoted above, focuses on external adaptation as well as internal integration aspects of a firm's culture. Xin, Tsui, Wang, Zhang, and Chen (2002) built upon this definition and came up with ten dimensions of Organization Culture of which six

> **relate to internal integration and** four to **external adaptation. The** 2

> **six dimensions** that **relate to internal integration** are: **employee development, harmony, leadership, pragmatism, employee contribution and fair rewards;** while the **four dimensions** that relate **to external adaptation** are: **outcome orientation, customer orientation, future orientation and innovation.** Using **the** 2

same definition of Organizational Culture by Schien (1992), Tsui et al. (2006) used an inductive approach and found five dimensions of Organizational Culture:

> **employee development, harmony, customer orientation, social responsibility and innovation. The** 2

first two,

> **employee development and harmony** represented the **internal integration** 63

aspect of Organizational Culture while the latter three,

> **customer orientation, social responsibility and innovation** represented **the** 63

external adaptation aspect of Organizational Culture. Since a

> **configurational approach takes a holistic view** and **emphasizes simultaneity and interaction among multiple causes of any outcomes** 2

(Tsui et al., 2006), these five dimensions are configured into Organizational Culture Types. As a result, in Tsui, et al,'s (2006) study, the five dimensions configure four culture types namely:

> **Highly Integrative Culture,** which focused **both** on **internal integration and external adaptation;** 2

the Market Oriented Culture, that emphasized

> **Customer Orientation** dimension **more than any other cultural** dimension; **the Moderately Integrative Culture,** that showed an **average** score **on all** the **five culture dimensions;** and **the Hierarchy Culture,** 2

that had a low mean score on all the five culture dimensions. The five dimensions of Organizational Culture stated above and other prominent dimensions of Organizational Culture proposed by various researchers are

> **discussed in the next section.** 2 **.4.2** Dimensions **of** 388

Organizational Culture Organizational Culture has been evaluated along many dimensions and this has resulted in models and theories which are conceptually different but fundamentally similar (Yiing & Ahmad, 2009). Given the multitude of its definitions,

> **it is not surprising that the** dimensions **of Organizational Culture** 153

have also been proposed and explained differently. Al-Alawi et al. (2007) mention that Organizational Culture develops gradually overtime and can be broadly classified as visible and invisible which reflect an organization's identity. The

> **visible dimension of culture is** enshrined **in the espoused values, philosophy and mission of the firm.** On **the** other hand, the **invisible dimension** is reflected **in the values that guide** the acts **and perceptions** of **organization'** s members. **(McDermott & O'Dell, 2001).** 117

> **Based on two dimensions** of solidarity **and sociability,** 473

> **Goffee and Jones (1998)** forwarded **four** main types **of Organizational** Culture: **Networked,** Communal, **Fragmented and** 105

Mercenary. Sociability is the relational friendliness among organizational members while

> **solidarity is the ability of** organizational members **to** work towards **shared goals efficiently and effectively** 19

keeping in view organizational objectives without paying much attention to

> **the impact on individuals and the relationships between them.** 350

> **Networked organizations** have **high sociability and low solidarity.** On **the** 23

other hand,

**Communal organizations are equally high in sociability and solidarity, characterized by common goals and social bonds. Fragmented groups are equally low in sociability and solidarity, appearing dysfunctional and ungovernable.** 23

**Mercenary groups** have **low sociability and high solidarity, focusing on strategy and success** 23

(Rashid, Sambasivan, & Rahman, 2004). Rashid, et al. (2004) used Goffee and Jones' (1998) framework in the Malaysian context and found that certain culture types facilitate organizational change while others do not. Somewhat similar to the dimensions of Goffee and Jones (1998),

**Locander (2005)** also **introduced four quadrants** but **labeled** them as **A, B, C, and D; each quadrant** representing **a flock of geese.** 23

Like in Goffee and Jones' (1998) model, these four quadrants differed in terms of presence of degree of sociability and solidarity. Quadrant A represented high sociability but less alignment and is characterized by more politics than values or performance. Quadrant B represented an Organizational Culture with high fragmentation, independent individuals and no common goal among the members of the organization. Quadrant C represented an Organizational Culture in which the members of the organization, like a buffalo herd, blindly follow one leader and the decisions of the inflexible management. The last quadrant, Quadrant D represents an Organizational Culture in which the members exercise a balance between solidarity and sociability and are goal-aligned and communally share the lead. Using Q-sort method, O' Reilly (1991) developed Organizational Culture profile with

**seven dimensions of Organizational Culture** namely: **innovation, outcome orientation, respect for people, team orientation, stability, aggressiveness and attention to detail.** 2

These dimensions were identified after Q-sorting 54 value statements obtained as a result of

**an extensive literature review.** These **dimensions of Organizational Culture** 2

have been widely used in many situations and settings. One of the pioneers in the field, Hofstede (1980)

**identified four dimensions of** national **culture** values: **Power Distance, Uncertainty Avoidance, Individualism/Collectivism and Masculinity/Femininity.** 245

**Power Distance** implies **the extent to which the less powerful members of an organization accept that** the **power is distributed unequally. Uncertainty Avoidance** refers to **the extent to which people feel threatened by ambiguous situations and have created beliefs and institutions that they try to avoid. Individualism reflects** 18

a culture type in which people look after themselves or their immediate families. In case of Collectivism, on the other hand people belong to a group

> **or collectives and look after each other in exchange for loyalty.** Lastly, **Masculinity** implies **a** situation **in which the dominant values are success, money and** professions while as **femininity** refers to **a** situation **in which the dominant** value **are caring for others and quality of life.** 97

This dimensionalization by Hofstede (1980) has been used in many studies covering many countries (Jarad, Yusof, & Nikbin, 2011). The above four dimensions were identified as national culture values which Hofstede (1980) mentioned were

> **primarily based on differences in values** learnt **during early childhood.** 39

However, it must be noted that

> **Organizational Culture** is **based more on differences in norms and shared practices** learnt **at the** work place **and considered valid within the boundaries of** the **organization** 39

(Jarad et al., 2011). In his book, Hofstede (1991) reports that based on his survey

> **two main ethnic groups in Malaysia (Malay and Chinese) are low** on **masculinity and high** on **power distance.** Abdullah (1992) used **the** 18

above four dimensions of Hofstede (1980) and reported that Malays scored low on individualism and attributed it to their religion (Islam) which emphasizes groups and societies rather than individuals.

> **Global Leadership Organizational** Behaviour **Effectiveness (GLOBE) Research Program (1992-2000)** 39

updated the above-mentioned model of Hofstede (1980) and included four more dimensions in it. The new dimensions added

> **were: future orientation, performance orientation,** human **orientation and assertiveness.** 39

Hofstede (1991) also conducted another

> **extensive study of Organizational Culture** and identified **six dimensions** 63

of Organizational Culture namely

> **process oriented vs. results oriented, employee oriented vs. job** 2

**oriented, parochial vs. professional, open system vs. closed system, loose control vs. tight control, and normative vs. pragmatic.** These dimensions **however** were **not** related **to antecedents or consequences of Organizational Culture**

(Tsui et al., 2006). Another famous set of dimensions of Organizational Culture is given by Cameron and Quinn (2006). According to these authors, organizations can have four culture types, which

**are: hierarchy culture, market culture, clan culture and adhocracy culture (Cameron & Quinn,** 280

2006, pp. 37-45). The

**hierarchy culture is characterized by a formalized and structured place to work, procedures** governing **what people do,** 229

**stability, predictability and efficiency, formal rules and policies.** 297
Organizations having **the market culture**

are

**oriented towards the external environment instead of internal affairs.** This culture **is** 100

made of tough and demanding producers and competitors who are focused

**on goals and targets** to **outpace the market competition.** The focus **is on** 23

transactions with external constituencies like suppliers, customers, contractors etc.

**Profitability, bottom-line results, strength in market niches, stretch targets, and secure customer bases are primary objectives** 100

while competitiveness and productivity are the core values of an organization with this type of culture. The clan culture is team- oriented, with focus on humane work environment, employee empowerment, participation, commitment, and loyalty. The use of word ‘clan’ in clan culture comes from its similarity to a

**family-type organization. Teamwork, employee involvement programs and corporate commitment to employees** 273

characterizes this Organizational Culture. Customers in this culture are dealt with as partners. Lastly, the adhocracy culture

**is dynamic, visionary, innovative and risk oriented, and** is **focused** 23

**on rapid leading edge knowledge and growth**

while being

**responsive to the hyper-turbulent** and ever **-accelerating conditions.** 466

It aims “to foster adaptability, flexibility, and creativity where uncertainty, ambiguity, and information overload are typical”. In a recent paper, Asmawi & Mohan (2011) set out to identify the

**existing dimensions of Organizational Culture in Malaysian R&D organizations.** 49

Based on qualitative interviews, past literature review and quantitative survey of private R&D companies (PRCs), universities and government research institutes (GRIs), the authors

**suggest that the Organizational Culture construct in R&D organizations may best be represented through a structure of** 49

**eight factors: teamwork and knowledge sharing, empowerment and recognition, conformity and impediments to R&D, risk-taking, customer orientation, autonomy, social networking, and organizational design.** 49

The measurement scale developed by the authors for the above dimensions in this same paper however does not seem to be highly reliable and this, in fact, is acknowledged by the authors as a weakness of the study as well. Tsui et al. (2006) conducted an extensive study of

**state-owned, foreign-invested** companies **and private domestic** firms in **the** 2

Chinese context and identified five cultural values namely:

**employee development, harmony, customer orientation, social responsibility and innovation.** Based on scores **for** 2

these culture values obtained in their study and comparing with “existing models”, the authors

**identified four configurations of culture profiles:** 63

**Highly Integrative Culture, Market Oriented Culture, Moderately Integrative Culture and Hierarchy Culture. The** five **culture** values identified **in** 2

this study

relate to both internal integration and external adaptation functions of the firms. A firm with a Highly Integrative Culture pays equally high attentions to employee development and harmony (facilitating thereby internal integration) and customer orientation, social responsibility and innovation 2

(facilitating external adaptation). Consistent with Schien (1992), according to this model firms emphasizing dimensions that contribute to these two functions (internal integrations and external adaptability)

are more effective in terms of managers' perception of firm performance, organizational support and commitment to the 2

firm. As mentioned before, this study uses the definition of Organizational Culture as given by (Schien, 1992) and uses the dimensions and measurements of Organizational Culture, based on this definition, developed by Tsui, et al. (2006). Several reasons exist for choosing the dimensions and measurements given by (Tsui et al., 2006). Firstly, the framework by Tsui et al. (2006) is quite recent as compared to other older models found in literature. Secondly, Tsui, et al.'s (2006) framework captures cultural values that lead

to both internal integration and external adaptability. In case of 63

Open Innovation, both internal integration and external adaptability are important. Thirdly, Tsui, et al.'s (2006) framework captures cultural dimensions which are relevant to Open Innovation. Employee development, harmony, customer orientation and innovation dimensions in particular

are relevant in the context of Open Innovation. 80

Fourthly, Tsui et al. (2006) developed the cultural dimensions scale, based on the seminal work of Schein (1992),

using both a qualitative and a quantitative approach. A two-phase design helps to ensure methodological rigour and capitalizes on the unique strengths of the two traditionally separate research orientations (Lee, 1999). 110

Fifthly and lastly,

to the best of this researcher's knowledge, there is no study done in the 198

Malaysian context using Tsui, et al.'s (2006) framework. Therefore, in addition to help answer the explicit objectives of this study, this research exercise will as well validate Tsui, et al.'s (2006) instrument in the Malaysian business context. 2.4.3

Organizational Culture and Performance The impact of Organizational Culture on several aspects of 345

| | |
|---|---|
| an organization, particularly the performance of an organization is | 227 |

well-known and cannot be underestimated. A review of literature leads to the conclusion

| | |
|---|---|
| that Organizational Culture is one of the most popular concepts in management and organizational theory (Ogbonna & Harris, 2000). One | 231 |

reason for this widespread popularity

| | |
|---|---|
| stems from the argument/assumption that certain Organizational Cultures lead to superior firm performance (Ogbonna & Harris, 2000). | 233 |

| | |
|---|---|
| There is such a multitude of studies investigating the relationship between Organizational Culture and | 326 |

firm performance that due to constraints of space, it is difficult and perhaps pointless to review all of them here. That is because several common threads run through many of these studies and the results of a majority of these studies lead to somewhat similar conclusions

| | |
|---|---|
| about the link between Organizational Culture and performance | 39 |

(Barney, 1986), with only the settings and contexts changing. Therefore only a few of such studies are elaborated here to drive home the point.

| | |
|---|---|
| Much of the literature on Organizational Culture and firm performance | 377 |

suggests

| | |
|---|---|
| that culture can have significant effect on the economic value for a firm (Barney, 1986). | 104 |

The positive and strong relation between Organizational Culture and

| | |
|---|---|
| firm performance has been reported in many studies (e.g. | 429 |

Aluko, 2003; Barney, 1986; Corbett & Rastrick, 2000;

| | |
|---|---|
| Deal & Kennedy, 1982; Oparanma, 2010; Ouchi, 1981; Peters & Waterman, 1982; | 413 |

| | |
|---|---|
| Petty, Beadles, Lowery, Chapman, & Connell, 1995; Wilkins & Ouchi, | 421 |

**1983;**

Yusoff, 2011). However, contrary to this, a few authors have argued that such a relationship is either non-existent or is weak (e.g. Reynolds, 1986; Saffold, 1988). Kotter and Heskett (1992) reported a significant and positive impact of corporate culture on long-term firm performance and noted that firms emphasizing different dimensions of Organizational Culture (customers, stakeholders and employees) significantly out- performed the firms that did not posses these cultural features. Broadly in line with these findings, Sadri and Lees (2001) stated that a positive corporate culture could benefit a firm immensely and give the firm competitive edge over its competitors while presence of a negative Organizational Culture could deteriorate the firm

**performance as it could** prevent the firm **from adopting the** necessary **strategic or tactical changes.** 18

Citing Crozier (1964), Porter (1980) and others, Barney (1986) in a well-regarded paper states that all Organizational Culture do not necessarily have a positive economic impact on the firm; instead Organizational

**Culture can** also **significantly reduce a firm's effectiveness** 422

"disabling the firm from perceiving all its competitive/operational options and preventing it from choosing options consistent with competitive/operational necessities". He also contends that a firm's culture can generate sustained competitive advantage, however for this to happen, the firm's culture should have three attributes of being valuable, rare and inimitable. At a macro level, Hofstede (1980)

**suggested that culture accounts for** economics **performance of various countries.** Narrowing down **the** 104

scope, Schein (1990) stated that Organizational Culture can help understand

**the differences that may exist between successful** firms **operating in the same national culture.** 264

In addition, by becoming a platform for specific and concrete actions, cultural values can also help a firm meet difficulty and challenges (Quick, 1992). Organizational Culture factors like market orientation, interaction orientation and innovativeness have been found to positively affect innovative capacity which in turn affects firm performance (Chih, Huang, & Yang, 2011). Partly similar to this, Canalejo (1995) shows

**that an innovation-based Organizational Culture must possess values** namely: **client-orientation, compromise with objectives, challenge and initiative, exemplary behaviour, team work and permanent improvement.** 145

From the above discussion, it is clear that in most cases desirable Organizational Culture values, when measured with economic or financial indicators, lead to superior firm performance. However some studies have investigated

**the impact of Organizational Culture on** another measurement **of** firm 418

performance: innovation. **The**

next section discusses this

**relationship between Organizational Culture and** innovation. **2.** 4.4 **Organizational Culture** **426**

and Open Innovation The criterion variable of interest in this study is Open Innovation. However, there is hardly

**a study** about **the relationship between Organizational Culture and** **19**

Open Innovation. This seems to

**be due to the fact that Open Innovation is a** **173**

rather new research area and there clearly is a need for further theoretical and empirical research (Lichtenthaler, 2011). According to Lichtenthaler (2011), Open Innovation processes involve foreign partners, and this adds an international dimension to it; and leads to cultural issues which deserve further analysis. One of the most prolific authors on Open Innovation (Scopus, 2011), Lichtenthaler (2011) particularly highlights

**the link between Organizational Culture and** **474**

Open Innovation as a ‘fruitful avenue’ for investigation.

**Pool (2000) suggested that Organizational Culture allowed an organization to address ever-changing problems of adaptation to the external environment and the internal integration of organization resources, personnel and policies to support external adaptation.** **19**

**van de Vrande et al. (2009)** found in **the** case **of** Dutch SMEs **that,** **87**

diverse in nature, the

**managerial and organizational barriers to Open Innovation are** **4**

**related to the organizational and cultural issues which arise when SMEs start to interact and collaborate with external partners.** **4**

They found that such

**issues are encountered in a range of innovation activities, including venturing, customer involvement, external networking, R&D outsourcing and external participations.** **4**

Therefore, in addition to helping in predicting the success of Open Innovation initiatives in many ways, an understanding of the link between Organizational Culture and Open Innovation can also give insights into the degree of openness a firm should practise (Lichtenthaler, 2011). As mentioned above, while the relation between Organizational Culture and Open Innovation is uninvestigated, at least empirically; the same cannot be said about the link between Organizational Culture and (closed) innovation. Several studies have reported on this link. Ahmed (1998) stated that possessing positive cultural characteristics can help an organization innovate and that culture could enhance or inhibit innovation. Jaskyte (2004; 2005) studied the relationships

> **between Organizational Culture and innovation in the** **240**

non-profit organizational setting and concluded that some dimensions of Organizational Culture significantly affect innovation. Looking at the issue from a practitioner's view-point, Phillips (2007) stresses that Organizational Culture can be an unlikely yet powerful barrier to innovation. He suggests that for innovation to succeed the culture of an organization must be dynamic enough to accommodate risk and uncertainty. Concurring with the need for this organizational dynamism, Khazanchi, Lewis, and Boyer (2007) state that innovation requires flexibility, empowerment, control and efficiency, all at the same time. Their research goes on to corroborate some of the past studies that have established this paradoxical view of innovation-supportive culture. In another research

> **on the relationship between Organizational Culture and innovation,** **188**

Nacinovic, Galetic, and Cavlek (2009) argue based on the data collected

> **among Croatian firms that a statistically significant relationship exists** between innovation-supportive **corporate culture and reward system features.** **161**

In other words, these authors show that firms need to focus on innovation-supportive Organizational Culture which

> **must be accompanied** by **an appropriate reward system.** **161**

In line with most of the above studies, Lin and McDonough III (2010) studied strategic business units (SBUs) across several industries in Taiwan and suggested that culture is crucial in enabling innovation ambidexterity

> **i.e. a firm's ability to** come up **with** **430**

multiple types of innovation simultaneously. Furthermore, Organizational Culture has been found to be

> **a clear determinant of innovation strategy** with the **adhocracy cultures** fostering **innovation strategies** while **hierarchical cultures** promoting **imitation** **259**

strategies

> **(Naranjo-Valencia, Jiménez-Jiménez, & Sanz-Valle, 2011).** Based on **419**

the

discussion above and Organizational Culture types identified 3 by following the procedures adopted by Tsui et al. (2006), the following hypotheses are developed: 3 In this study, three types of Organizational Cultures were identified post cluster analysis, as opposed to four types found in the study by Tsui, et al.'s (2006). Of these three types of Organizational Cultures represented by dummy variables in the regression models during data analysis, only two, Highly Integrative Culture and Hierarchy Culture, are introduced in the regression models while the third Organizational Culture, Moderately Integrative Culture is chosen as the reference category for the other two dummy variables. Please refer to Section 4.11 of Chapter 4 for full explanation of this. H7a: Highly Integrative Organizational Culture relates positively to In-bound Open Innovation. H7b: Highly Integrative organizational relates positively to Out-bound Open Innovation. H8a: Hierarchy Organizational Culture relates negatively to In-bound Open Innovation. H8b: Hierarchy Organizational Culture relates negatively to Out-bound Open Innovation. Open Innovation, besides being affected by OCBs, Managerial Ties and Organizational Culture can also be determined by another variable called Regimes of Appropriability. Regimes of Appropriability in

this study is suggested to moderate the relationship between OCBs, Managerial Ties &Organizational Culture and — 179

Open Innovation. This moderating variable

is discussed in the next section. 2.5 — 394

Regimes of Appropriability Often times, mere favourable internal resources and conditions within a firm, like the ones discussed in previous sections, may not be good enough to lead to successful Open Innovation. Firms need to understand their external environment to survive volatile times (Yeo, 2005).

Teece (1988) showed that the benefits of an innovation by a firm are potentially shared by four groups: the innovating firm, the customers of the firm, suppliers of the firm, and the imitators or followers who even without investing much in the initial R&D accrue benefits of the innovations. As Teece (1986) noted, the ability of firms to monetize their innovations depends on appropriability. In the absence of appropriability, imitators will commercialize the idea, depriving the innovating firm of any incentives to invest in innovation activities again. — 1

Before creating Open Innovation,

it is thus important for a firm to measure its potential benefits and check whether it can appropriate the results of its innovative activities. — 1

Seizing the results of innovation

is vital for innovative companies because it allows them to benefit from the profits their innovations generate (González-Álvarez & Nieto-Antolín, 2007). In absence of favourable Regimes of Appropriability, firms may be unable to seize even the cost of investment in their innovation — 1

**activities while the**"second mover" **firms may benefit more than the original innnovator firm.** Therefore reconnoitring the **appropriability** conditions of **the**

industry can help determine ex ante the benefits of potential Open Innovation. Regimes of Appropriability can also decide whether firms in a particular setting should enter the Open Innovation paradigm or continue to rely on their internal R&D. Appropriability is defined as the "ability of the owner of a resource to receive a return equal to the value created by that resource"

**(Levin et al., 1987; Teece, 1987). Atkins (1998) defines appropriability as**"the ability of different stakeholders to retain for themselves the financial benefits that arise through the exploitation of an innovation". **West et al (2006a) state that in the context of public policy,**"appropriability is what allows the innovator to capture a return from the value created by an innovation". **Regimes of Appropriability thus are the institutional or industry dynamics that allow a firm to safeguard its innovations and benefits thereof.** 1

If the

**firm that creates innovation is the main beneficiary of the innovation,** 1

the situation is called 'strong appropriability regime', and if the

**creator of innovation gains less than other stakeholders,** 1

it is referred to as 'weak appropriability regime'.

**Strong Regimes of Appropriability are generally characterized by tacit knowledge and strong legal protection. On the contrary, codified knowledge and weak legal protection are the features of weak Regimes of Appropriability (Hurmelinna, Kyläheiko, & Jauhiainen, 2007).** 1

Drawing an analogy, this relation looks somewhat similar to

**the relationship between Managerial Ties and firm performance** 441

in transition and developed economies. In transition economies, managerial relations may be necessary to gain institutional advantage (Li & Zhou, 2010) and superior performance. As opposed to this, developed economies generally exhibit the characteristics of strong Regimes of Appropriability wherein advantages are based on some intangible assets (Sim & Pandian, 2003) and laws and regulations are strong. Thus in economies with proper market supporting institutions like clear laws and regulations (Peng & Luo, 2000), strong appropriability regimes are expected to exist and thus knowledge spillovers are low and investments in potential innovations are likely to be high as investors expect positive returns.

**On the other hand, under weak appropriability regimes as may be expected in transition economies, since knowledge spillovers are high (Kafouros & Buckley, 2008), investors would be skeptical about the returns and thus investments in projects related to innovation are likely to** 1

**be low.** In addition, **under strong appropriability regimes, firms will choose to patent their innovations in order to deter imitation by rivals and protect their revenue streams (Anton & Yao, 2004). Under weak appropriability regimes, as obtaining patents, copyrights, etc requires some disclosure of enabling knowledge to the parties concerned (Anton & Yao, 2004) and since patents and copyright laws**

often do not provide the extent

**of protection they were** supposed **to (Atkins, 1998), firms may use isolating mechanisms like adopting secrecy in routines and operations to obstruct imitation and derive benefits from innovations (Zahra & George, 2002). Hence, in a fully protected innovation environment (strong appropriability conditions), full disclosure poses no risk of unauthorized imitation, but with limited protection (weak appropriability conditions), disclosure risks imitation (Anton & Yao, 2004). In line with conventional view that strong appropriability regimes encourage Open Innovation (Chesbrough,** 2003a; **Cohen & Walsh, 2001; West et al., 2006a), Laursen and Salter (2005) empirically showed that** that **Open Innovation is strongest in industries with strong Regimes of Appropriability (e.g. pharmaceutical, electrical) and weakest in industries with low Regimes of Appropriability (e.g. textile). Nevertheless, Teece,** Pisano, and Shuen **(1997) concluded that absent strong appropriability regimes, firms can create advantage through superior `dynamic capabilities' such as rapid learning, although such advantages would be rare and less sustainable than those provided by formal appropriability (as read in: West et al., 2006a, pg 115). In general,** reconnoitering **the appropriability conditions of an industry can help determine its favorableness for innovation. Although, according to Harabi (1995), measuring appropriability is difficult because of the lack of a**"theoretically sound" **and an**"empirically precise" **method of measuring the private and social returns of innovation. Nonetheless, some means of judging appropriability conditions, brought forth due to the efforts of many researchers, are: patents, lead time,** 1

secrecy, superior sales or service efforts,

**moving quickly down the learning curve,** 68

economies of scale,

**making imitation more difficult for competitors, national advertisement and national distribution (López & Roberts, 2002). These have been broadly divided into three groups: a) patents, b) secrecy, and c) lead time and related advantages (Scherer & Ross, 1992).** This **study uses these three industry-level measures of appropriability to study** 1

**appropriability**

of the target industries in this study.

**There is hardly a study about how appropriability conditions affect the relationship between OCBs, Managerial Ties and** Organizational Culture, and **Open Innovation. Can appropriability conditions skittle the creation of Open Innovation even in** the **presence of OCBs,** favorable Organizational Cultures **and good Managerial Ties? How effective are appropriability conditions in creating successful Open Innovation? A few studies report on the relation between appropriability regimes and Open Innovation, but the results are contradictory. According to the conventional view, strong appropriability regimes create increased willingness among innovators to offer internal innovations for others to use thereby enhancing Open Innovation outcomes (Chesbrough,** 2003a). **However, Laursen and Salter (2005) found through a large-scale survey that Open Innovation provides better results in moderate Regimes** of Appropriability. **Adding to** this **difference in results,** 1

**Fabrizio (2005) reported negative relationship between high appropriability and aspects of Open Innovation.** 1

Hence

**no clear role of the appropriability regimes is established in the literature.** 1

**Dosi et al. (2006) broadly conclude that appropriability conditions in general have only limited effects on the pattern of (closed) innovation. Given this dichotomy between the results of several different studies on innovation, this research aims to address the moderating role of Regimes** of Appropriability **between OCBs,** Organizational Culture, **Managerial Ties and** 1

Open Innovation respectively.

**Therefore, on the basis of** the **discussion in above sections, the following** hypotheses are **developed:** 1

H9a: Regimes of Appropriability moderates the relationship between OCBs and In- bound Open Innovation. H9b: Regimes of Appropriability moderates the relationship between OCBs and Out- bound Open Innovation. H10a: Regimes of Appropriability moderates the relationship between Managerial Ties and In-bound Open Innovation. H10b: Regimes of Appropriability moderates the relationship between Managerial Ties and Out-bound Open Innovation. H11a: Regimes of Appropriability moderates the

relationship between Organizational Culture and In-bound Open Innovation. H11b: Regimes of 125

Appropriability

moderates the relationship between Organizational Culture and 165

Out-bound Open Innovation. 2.6 Theoretical underpinnings In conducting any research study, it is important to support the investigation with relevant theory/theories. Therefore

building on the existing knowledge of organizational behaviour, networks and innovation management, this study is conducted on the 1

basis of the Dynamic Capabilities approach and Social Exchange Theory. 2.6.1 Dynamic Capabilities The study seeks to answer how several organizational variables affect Open Innovation. The focal variable in

this study is Open Innovation. The dynamic capabilities theory is used to support the 454

framework of this study. According to Teece (1992) and Teece et al. (1997),

since the 1990s relentless competition has forced firms to constantly adapt, renew, reconfigure and re-create their resources and capabilities in line with the changing competitive environment. 148

The notion of dynamic capabilities captures this. Globally, Teece et al. (1997) believe, competitiveness

in high-technology industries has highlighted the need for an expanded paradigm to understand how competitive advantage 243

is achieved. The authors state that merely having a “resource-based strategy” to accumulate valuable technology

assets – often guarded by an aggressive intellectual property stance– does not often support a significant competitive advantage. 235

Achieving

competitive advantage requires both the exploitation of existing internal and external firm-specific capabilities, and developing new ones 16

(Penrose, 1959; Wernerfelt, 1984). Winners are the

firms that demonstrate timely responsiveness and rapid and flexible 90

**product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences (Teece et al., 1997).**

**Teece et al. (1997) refer to** this **ability to achieve new forms of competitive advantage as** 70

**'dynamic capabilities' and** define it **as** a **firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.** 70

Acknowledging that the

**elements of the** dynamic capabilities **approach can be found in** 16

many past works including those of Schumpeter (1942), Penrose (1959) and many others,

**Teece et al. (1997)** build upon **the** theoretical **foundations provided** by **the** 130

pioneering scholars. In line with this, the dynamic capabilities approach provides support

**for the** framework **of this study. Open Innovation** refers **to** 440

"the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively"

**(Chesbrough et al., 2006). The Open Innovation paradigm** 186

**assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. The Open Innovation process** 30

provides for

**projects** to **be** initiated **from internal or external sources.** Similarly, **new technology can** come in **at** different **stages.** 15

Besides traditional sales channels,

**projects can go to** the **market in** different **ways, such as** through **out-licensing or spin-off** ventures **(Chesbrough,** 239

2003a). Teece et al. (1997) emphasize two key aspects of dynamic capabilities: dynamic and capabilities.

> **'Dynamic' refers to the capacity to renew competences so as to achieve congruence with the changing business environment; certain innovative responses are required when time-to-market and timing are critical, the rate of technological change is rapid and the nature of future competition and markets difficult to determine.** On **the** other hand, **'capabilities' emphasizes the key role of strategic management in appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment.** 16

Both these aspects are relevant to Open Innovation. The

> **dynamic capabilities approach** also **emphasizes the development of management capabilities, and difficult-to-imitate combinations of organizational, functional and technological skills.** 172

This approach also stresses on

> **exploiting existing internal and external firm-specific competences to address changing environments. In** concurrence with this, **the** 246

Open Innovation model regards R&D

> **as an**"open system" **in which ideas can come from both inside and outside of the organization and can go to the market through similar channels** (Vanhaverbeke, **2006).** 1

Thus Open Innovation also refers to the innovation process in which the

> **boundaries of the firm are** porous **(Chesbrough, 2003a). In** 409

addition, in the Open Innovation paradigm and in line

> **with the dynamic** capabilities **approach (Teece et al., 1997),** 216

in order to

> **adapt to global change, organizations focus on their core competency by looking outside and relying on other companies to provide complementary capabilities (Hagel & Brown, 2005).** 1

Therefore, the dynamic capabilities approach provides strong support for the framework of this study. 2.6.2 Social Exchange Theory

**Social Exchange Theory states that individuals or groups interact with each other for a reward or in its expectation (Emerson, 1976). Pioneering scholars** 1

like Blau, Homans, Kelly and Thibaut (1964; 1958; 1959)

**laid the foundation of this theory which later became popular in many disciplines including management research. Social Exchange** 1

Theory states that people engage in a relationship if there is a feeling that their commitment will be responded to by the people they are dealing with and that all human relationships are a result of a subjective cost-benefit analysis.

**Social exchange relationships also implicitly assume that extra-role efforts over time are recognized, appreciated and rewarded (Ishak, 2005). The** 1

basic assumptions of the Social Exchange Theory are that (1) rationality of the people who seek to maximize their profit by opting for the best possible means to interact;

**(2) most gratification is centered in others; (3) individuals** 106

**assess alternatives** and **more profitable situations** than **their** 476

current conditions as they enjoy access to information related to the social, economic and psychological dimensions;

**(4) people are goal-oriented; (5) building social credit is preferred to social indebtedness; and (6)** Social Exchange Theory **operates within the** limits **of a cultural context** 106

designed by others (Narasimhan, Nair, Griffith, Arlbjorn, & Bendoly, 2009). Extending this

**theory to the setting of** this **study, employees can expect benefits from their employers if they practice** Organizational Citizenship Behaviours **and help the organization overcome challenges that it may face while embracing the Open Innovation model. These benefits can come in the form of** 1

promotions, awards, incentives and other methods of recognition. In this hope

**employees can be expected to perform the extra-role behaviours** 1

**while the firm is embracing the Open Innovation paradigm and is in** 1

**need of addition commitment and support from the employees.**

**Similarly, the raison d'etre for ties that managers establish with different people is a rational expectation of a reward or reciprocation. Managerial Ties form a part of social capital or social exchange. Social capital is known to affect among others career success, executive compensation, improving inter-firm learning etc. (Adler & Kwon, 2002). The ties of managers thus are not only expected to** benefit **the managers as individuals but help the firm meet its objectives as well. To conclude, the Social Exchange Theory provides a cogent reason to believe that employees practicing** Organizational Citizenship Behaviours **and establishing Managerial Ties as processes of social exchange** 1

in their given Organizational Cultures will be favorable to

**Open Innovation** efforts **of the firms they work for besides accruing to them individual recognition in different forms.** 1

The next chapter discusses the methodology

**used to test the** twenty-two (22) **hypotheses developed in the** 434

literature review above. CHAPTER THREE METHODOLOGY 3.0 Introduction In the previous chapter, many hypotheses were developed. The aim of this study is to test those hypotheses. It is only with an appropriate methodology that the results can be meaningful. Thus the eight sections of this study present the methodology that was used to conduct this study. The first section discusses the philosophical moorings of

**this study. The second section** discusses **the research** design while **the** third section discusses **the** 114

research approach taken to conduct this study. In the fourth section, sample, target population, sampling method, sampling constraints, sampling frame and procedures and finally sample size are discussed. The fifth section gives a brief discussion of the questionnaire design. The sixth section provides the operational definitions and measurement of the variables of interest of this study. In the seventh section, an assessment of the questionnaire validity is done

**on the basis of literature review and** expert judgement. In **the** same section, reliability **of the** 104

questionnaire is also checked through a pilot test. In the eighth section, a

**brief overview of the** main **data** analysis techniques **used in this** 227

study,

**including exploratory factor analysis, confirmatory factor analysis** 359

and **multiple** hierarchical **regression**

is given. 3.1 Research Paradigm For any knowledge to be taken seriously, it is important to consider some underlying assumptions regarding how it was acquired. In a well-cited paradigmatic framework, Iivari, Hirschheim, and Klein (1998) delineate four such main assumptions:

**1. Ontology,** which **is concerned with the structure and properties of what is assumed to exist, i.e., the basic building blocks that make up the phenomena or objects to be** 36

examined. 2.

**Epistemology, which is concerned with the** nature **of knowledge** 45

and the procedures or means by which knowledge can be obtained. 3. Research methodology, which

**refers to the procedures (research methods) used to acquire knowledge.** 36

**4. Ethics of research,** which **refers to assumptions about the responsibility of a researcher for the consequences of his/her research approach and its results.** 36

This research is a positivist study.

**Positivism seeks to explain and predict what happens in the social world by searching for** irregularities **and causal relationships between its constituent elements** 155

(Iivari et al., 1998). Auguste Comte

**formalized the idea of**"positivism"**as an epistemological position. Building on** the **ideas** of **Aristotle,** Francis Bacon **and** 42

Isaac Newton,

**Comte (1966) held that all metaphysical speculation is invalid and the only appropriate objects and criteria of human knowledge are data from sense experience.** Comte, unlike **Newton** who **focused on the physical world** only, **extended the idea of axiomatic scientific thinking to the study of all phenomena, including social relations** 42

(Bennett, 2005). Thus being a positivist study, the

> **aim of this research is to** objectively measure **the** social **phenomena,** 399

> **in this** case, **the relationship between Organizational** Citizenship Behaviours, Organizational **Culture,** Managerial Ties **and** 398

Open Innovation under the moderating effect of Regimes of Appropriability. Positivist research aims

> **to identify causal explanations and fundamental laws that explain regularities in human social behaviour and** considers natural **science** 98

as the only rational source of knowledge and should thus be applied to social sciences, focussing on internal validity, external validity, reliability and operationalization (Johnson & Duberley, 2000, p. 39). All these are explained in the following sections. 3.2 Research Design Research design plays a vital role in conducting any research and provides the basic directions or “recipe” for carrying out the project (Hair, Money, Samouel, & Page, 2007). After the research problems are identified and hypotheses are developed, research design acts as

> **a master plan** guiding **the methods and procedures for collecting and analysing the needed information. Research** 93

design involves determining the

> **sources of information,** the **design** technique **(survey or experiment, for example) the sampling methodology and the schedule and cost of the research** 177

(Zikmund, 1997).

> **According to Hair et al. (2007), there are** three main **types of research** 69

designs: exploratory, descriptive and causal design. For descriptive and causal research, there are four basic design techniques: surveys, experiments, secondary data and observation. Zikmund (1997) states that objectives of the study, availability of the data sources among others determine the choice of a proper type of research design. According to the

> **Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data,** which **is** 5

treated as the bible for innovation-related surveys,

> **innovation data can be collected through census or sample surveys.** 5

While in most cases, census (survey of entire population) may not be possible due to resource limitations, sample survey is useful (Oslo Manual, 2005, p. 120). In this backdrop, the survey method, which is the most common method of gathering primary data, is chosen to meet the

**objectives of** this **study. In addition to** other factors, **the** absence of any **secondary data** 73

regarding the model this study aims to test necessitates using the survey method.

**A survey** method **is a research technique in which** 390

questionnaires are used to gather information from a sample of people. The survey is a systematic, standardized and common approach for collecting information from individuals who represent the study population. This method is

**simple to administer, the data obtained are reliable,** variability is less, **and** coding, analysis and **interpretation of** the **data are relatively simple (Malhotra,** 234

2004, p. 169). Pursuant to an in-depth literature review and face validity tests by experts in the field, a questionnaire was prepared and administered to the sample. This study is a cross-sectional study. In a cross-sectional

**study, either the entire population or a subset thereof is selected, and from these individuals, data are collected to help answer** the **research questions of interest.** 77

The information

**gathered represents what is going on at** only **one point in time (Olsen & George, 2004). It is** recommended that **the** 77

**length of the observation period for innovation surveys** 5

be less than one year or not exceed three years (Oslo Manual, 2005, p. 61). In line with this, data for the purpose of this study were collected over a five-month period from January 2012 to May 2012. All

**these are** explained **in** further **detail in the following sections. 3.** 335

3 Research Approach There are two main research approaches: quantitative and qualitative. In the quantitative research, numbers are assigned directly to represent characteristics of something while as in qualitative approach numbers are not assigned to the description of things (Hair et al., 2007). Since quantitative research involves numbers, statistical analyses are appropriate. Hair et al. (2007) compare the two approaches, highlighting the differences and noting that, in quantitative research, hypotheses are developed whereas in qualitative research developing hypotheses is avoided or less frequent. Many differences exist between these two approaches as Hair et al. (2007) explain in their book. A positivist paradigm typically uses a quantitative approach while the interpretivist paradigm usually employs a qualitative approach. Besides the quantitative approach tends to be deductive in nature as against the qualitative approach which tends to be inductive. In case of deductive research, sometimes also called a top-down approach, a researcher begins with a general theory and ends with observations and their confirmation. In other words, deductive research

**works from the more general to the more specific.** 48

In contrast, in inductive research - exemplified by the qualitative approach - a researchers

**moves from specific observations to generalizations and theories** 48
(Burney, 2008). **This** study uses **a** quantitative **approach**

to answer its objectives. The qualitative approach is not chosen because the qualitative approach is appropriate in the early stages of research, mainly in

**exploratory research. Exploratory research is** used **when** the researcher 69
has **little information**

(Hair et al., 2007). All the variables in this study are either well-researched (Organizational Citizenship Behaviour, Organizational Culture, Managerial Ties and Regimes of Appropriability) or moderately researched (Open Innovation). Therefore in this study the researcher seeks to quantify relationships between different variables of interest by first developing hypotheses and later testing those hypotheses using statistical analyses. Questionnaire survey, a typical quantitative technique, is used to collect the data 3.4 Population, Sample, and Data Collection Procedures 3.4.1 Sample and Unit of Analysis As indicated above,

**this study used questionnaire survey method to** collect data **from** 194

the respondents. Choosing a firm's most suitable respondents is of utmost importance to innovation surveys. This is because the

**questions are** very **specialized and can be** properly **answered by only** 236
**a few people in the** firm. As per **the**

Oslo Manual (2005, p. 123), Managing Directors are often good respondents for innovation surveys in small firms, while in larger firms, several people can be appropriate respondents. In this study, these guidelines were kept in view and the information related to the surveyed firms was collected only from middle managers (at least managers) and top managers (above senior managers) who were mostly R&D executives. The

**unit of analysis** of **this study is the** employees **of** the surveyed **firms.** 369

The middle managers and top managers are chosen because of their know-how of the strategic direction of their firms. Moreover, a proper

**completion of the questionnaire** requires reliable **knowledge of the** 68
**technology as well as of the market conditions in a certain line of business**

(Harabi, 1995) and middle and top managers are deemed to be the appropriate personnel involved with the firm strategy and direction, participating in the making and implementation of many policies. 3.4.2

**Target Population Target population** is **defined as the complete** 184

group of specific population elements relevant to the research project (Zikmund,

1997).

The target population for innovation surveys involves innovators and non-innovators, R&D performers and non-R&D performers in the business enterprise sector, including both goods-producing and services sectors. 5

In the

case of sample surveys, the sample frames should correspond as closely as possible to the target population 5

(Oslo Manual, 2005, p. 21). The population of this study was the middle and top managers who were working in the Malaysian manufacturing firms operating in the four industries classified as high-tech (aka hi-tech): Aerospace,

Computers and office machinery, Electronics and communication, and 47

Pharmaceuticals. Although

innovation activities take place in all parts of an economy - in manufacturing, the service industries, public administrations, the health sector and even private households - in reality, for various theoretical and practical reasons, a survey cannot cover all possible units. This is because the concept of innovation may be less clear in some parts of the economy, especially for non-market-oriented activities 44

(Oslo Manual, 2005, p. 118). Keeping this in view, the manufacturing sector, as opposed to the services sector, is chosen in this study because the

incidence and adoption of Open Innovation is anticipated to be stronger in manufacturing 4

sector (van de Vrande et al., 2009). According to Gassmann (2006), industries

characterized by globalization, technology intensity, technology diffusion, new business models and knowledge leveraging 4

are more prone to Open Innovation 4

adoption; and

**van de Vrande et al. (2009) suggest that** 111

these characteristics

**are more applicable to manufacturers than** service **enterprises.** 4

This study uses the industry classification as provided by OECD (1997). According to this classification of industries, the high-technology sector comprises four industries namely: Aerospace industry,

**Computers and office machinery** industry, **Electronics and communication** industry **and** 47

Pharmaceuticals industry. Hence, the variables of interest of this study are analyzed

**by means of a sample of firms operating in** these **four** industries. The **high-tech** 55

sector has been chosen for many reasons. Firstly, the industries in this sector are primarily knowledge-driven industries (Hatzichronoglou, 1997). Cloodt, Hagedoorn, and Van Kranenburg (2006) quote Bierly and Chakrabarti (1996) stating that

**learning is expected to be a key determinant in creating and sustaining a competitive advantage for many of the sample firms in** the high-tech **industries.** 55

Secondly, this sector is chosen because the level of

**adoption of Open Innovation** in **high-tech industries** is expected **to** be relatively higher **than** 370

in other industries. Since Open Innovation is rather a new concept, more so in the Asian context, much of the existing research shows that the adoption of Open Innovation is higher among high-tech industries than in asset-intensive mature industries. Thirdly, the high- tech sector is chosen because,

**particularly in these industries, R&D expenditures, patents and new products play a role in indicating important aspects of innovative performance (OECD, 1997).** 152

This is not to say that Open Innovation has not been reported in other industries. A few studies have reported adoption of Open Innovation among non

**-high-tech industries** also **(e.g. Chesbrough & Crowther, 2006;** 382

Chiaroni et al., 2011), however, to ensure proper population and adequate sample selection, this study chose the industries classified as high-tech sector. 3.4.3 Sampling Constraints In order to get responses from relevant respondents, certain sampling constraints were applied in this research (Oslo Manual, 2005).

These sampling constrains are highlighted below: a) The responding firm should have

> **a Research and Development (R&D) department and** 224

only the firms that met this requirement were approached (Oslo Manual, 2005). b) The respondents should be at least at the middle management level or above (Oslo Manual, 2005). c) The respondents should have served at least five (5) years in the same firm. 3.4.4 Sampling Method

> **Two broad categories of** traditional **sampling methods** exist: **probability and non-** 69

> **probability sampling. In probability sampling, each element of the** target **population has a known,** 141

but not necessarily equal,

> **probability of being** selected **in the sample;** whereas in **non-probability** 156

sampling the researcher decides the inclusion or exclusion of the elements of the target population (Hair et al., 2007). According to Zikmund (1997, pp. 430-436), there are four main types of probability sampling techniques: a)

> **simple random sampling, a procedure that assures each element in the population an equal chance of being included in the sample,** b) systematic **sampling,** 76

> **in which an initial starting point is selected by a random process, and then every nth number on the list is selected,** 93

c) stratified sampling, in

> **which sub-samples are drawn from** samples **within different strata that are more or less equal on some characteristic,** and d) cluster **sampling,** in which **the** 76

> **primary sampling unit is not the individual element but a large cluster of elements.** 156

Hair et al. (2007) highlight four main types of non-probability sampling: a) convenience sampling, in which

> **sample elements are most readily available to participate in** the **study and** who can **provide the** required **information;** 95

b) judgment sampling, also referred to as purposive sampling, in which elements are selected for a particular purpose based on the researcher's judgment and belief that the sample elements represent the target population; c) quota sampling in which the researcher defines the strata of the target population, determines the sample size and sets a quota for the sample elements from each stratum; and, d) snowball sampling in which

> **the initial respondents** are used **to identify the other respondents in the target population** 141

and the process is continued till the required sample size is reached. This study used a two-stage sampling procedure (Davis, 2005) involving stratified sampling and convenience sampling techniques. In the first stage, stratified sampling was used and the high-tech industry was sub-divided into four (4) industries, namely Aerospace industry,

> **Computers and Office Machinery** industry, **Electronics and Communications** 55

industry and Pharmaceuticals industry. As is explained in detail in Section 3.4.5 later, two sampling frames were used to obtain relevant lists of firms in these four industries. In the second stage, convenience sampling was used to select firms from the four industries. In this stage, efforts were made to include as many eligible respondents as possible from the four high-tech industries. The procedure of sample selection

> **is explained** further **in detail in the next section.** 416

3.4.5 Sampling Frame and Procedures

> **Sampling frame is the set of source materials from which the sample is selected** (Turner, 2003). **The** 79

> **sampling frame must capture, in a statistical sense, the target population** and **a perfect sample frame is one that is complete, accurate and up-to-date** 79

(Turner, 2003). In other words, sampling frame is required to define the population. Sometimes also called as the working population, the sampling frame provides the list that can be operationally worked with. It could be a list from households, establishments, and industries with detailed addresses, products produced and/or consumption, expenditure, revenue data, etc (International Monetary Fund, 2010).

> **For sample surveys, the sample of enterprises should be large enough to give reliable results for the units in the target population and characteristics of interest in the target population, such as specific sectors** 5

(Oslo Manual, 2005, p. 120). Keeping the above guidelines in mind, the current study involved two sampling frames. The first sampling frame was taken from Malaysian Manufacturers' Directory (2011). Researchers have used this database in the past also to study Malaysian manufacturers (Chong, Ooi, & Sohal, 2009). An updated list of the manufacturing firms operating in three (3) high-tech industries was retrieved. These industries included:

| Computers and office machinery, Electronics and communication and | 47 |
|---|---|

Pharmaceuticals.

| In the Computers and office machinery industry, | 47 |
|---|---|

82 organizations were identified; in Electronics and communication industry, 614 organizations were identified; while in the Pharmaceuticals industry, 122 firms were identified. Details of all these organizations were retrieved. As highlighted earlier, many sampling constraints were applied to these lists of companies to meet the requirements of this study. As a result, a total of 76 organizations in

| Computers and office machinery industry, 135 in Electronics and communication industry and | 47 |
|---|---|

35 in Pharmaceuticals industry were finally short-listed and contacted. In addition, a Pharmaceutical exposition by the name of 15 th SouthEast Asian Healthcare & Pharma Show, was held in Kuala Lumpur City Centre (KLCC), Kuala Lumpur from April 17-19, 2012. This exposition provided an opportunity to the researcher to collect more data from the pharmaceutical companies. Pharmaceutical companies from over fifteen countries participated in this exposition, however only the managers of Malaysian pharmaceutical firms that had R&D departments

| were asked to participate in this study by filling up the | 226 |
|---|---|

questionnaires. Fifty-two firms were approached in the exposition and asked to fill up the questionnaire. This researcher, with the help of two fellow PhD students, distributed and collected the questionnaires on the first two days of this three-day exposition. The second sampling frame of this study involved the fourth high-tech industry, the Aerospace industry. As aerospace firms were not indexed in the Malaysian Manufacturers' Directory (2011), a list of firms operating in the Aerospace industry was retrieved from the Aerospace Industry Report (AIR) Online Database. This database is run by The Malaysian Aerospace Council (MAC), “a national level steering body, dedicated to the development of the aerospace industry in Malaysia”. Looked after by

| Malaysian Industry-Government Group for High Technology | 478 |
|---|---|

(MIGHT), this council works under the chairmanship of the Prime Minister of Malaysia. According to the council website, the AIR Database is a regularly updated, comprehensive list of the aerospace industry players in Malaysia. This researcher was able to retrieve a list of 233 aerospace firms from the database (Malaysian Aerospace Council, 2011). However, a large number of these firms provided services to their customers and, thus could not form the sample of

| this study. For the purpose of this study, | 91 |
|---|---|

only forty-eight firms were considered appropriate and were approached. According to the Oslo Manual (2005, p. 119), the frame population underlying the survey

| may include units that no longer exist, or units that no longer belong to the target population. At the same time, it may not contain units that in fact do belong to the target population | 5 |
|---|---|

**(Hair et al., 2007, p.** 173). **In** view of **this, the** 69

short-listed firms in all the four high-tech industries were contacted by telephone and after initial enquiry, appointments were made for questionnaire distribution; and explanations were provided wherever needed. In view of the researcher's inability to speak the local Malaysian languages effectively, help of a local undergraduate student (who could speak the local languages) was taken in making appointments. This significantly reduced the otherwise usual rejections. In total, 900 questionnaires were distributed by email and in person; 366 were returned from 139 firms – 68 by email and 298 in person.

**As suggested by Hair et al. (2010), the** 14

questionnaires that had more than 10 percent missing values were discarded. No questionnaires received electronically had missing values, apparently because the electronic questionnaires prompted the respondents to answer all the questions before submission. On the other hand, all the discarded questionnaires, 27 in number, were those that were collected in person from the respondents. In total, 339 usable responses, from 133 firms, were considered 'clean' and thus used in further data analysis. The response rate thus achieved in this study is 37.66 percent. This can be considered a decent response rate considering that some recent similar studies in the Asian context (e.g. Abulrub & Lee, 2012) wherein less than 7% response rate was reported. This and the other statistics related to data collection are shown below in

**Table 3.1. Table 3.1: Response rate** to the **survey** 349

Industry Total firms identified Total Firms shortlisted and contacted No. of firms that agreed to answer No. of questionnaires distributed b No. of firms that responded No. of questionnaires collected No. of respondent firms after data cleaning No. of questionnaires after data cleaning a Response rate (%) Aerospace 233 130 48 170 21 77 20 73 15.38 Computers 82 76 28 130 19 87 19 87 25.00 Electronics 614 135 72 300 31 97 28 76 20.74 Pharmaceutical 122 35 22 100 16 38 15 40 (Collected in Expo 52 52 52 200 52 67 51 63 workshops) Total Pharmaceutical 174 87 74 300 68 105 66 103 78.16 Grand total 1277 428 222 900 139 366 133 339 37.66 * * Response rate = (a/b) (100) However, before the questionnaires were sent out to 'real' managers, a pilot test was conducted. The procedures and need for pilot-testing is discussed in Section 3.7.3. 3.4.6 Sample Size There are several guidelines about determining the size of sample. One rule of thumb is to have at least

**five respondents for each parameter estimate** as long as **other multivariate assumptions are met (Bentler & Chou, 1987). The total number of parameter estimates** (questions in questionnaire) **is** 3

60. Hence to meet the criterion suggested by Bentler and Chou (1987), the minimum sample size for this study needs to be: 60 x 5 = 300. Given that the sample size of this study is 339 usable responses, it is well above the threshold. 3.5 Measurement of

**Variables The variables of interest in this study** 70

were measured with items adapted from various past studies. A survey

**questionnaire was designed to elicit responses from the respondents with respect to** 1

Organizational Citizenship Behaviours (predictor variable), Organizational Culture (predictor variable), Managerial Ties (predictor variable), Regimes of Appropriability (moderating variable) and Open Innovation (criterion variable). In addition, questions related to the firm profile were also asked in the questionnaire. A detailed explanation about the measurement/operationalization of the variables is given below. 3.5.1

> **Organizational Citizenship Behaviours Organizational Citizenship Behaviours (OCB)** are **defined as** 147

> **discretionary, extra-role** behaviours **of employees which** exceed **the prescribed formal roles, and are** 17

> **not directly or** clearly demanded **by the formal** award **system (Organ, 1988).** OCB performed by **the** 121

employees of a firm exceed the minimum job requirements as anticipated by the employer and hence advance the well-being of the co-workers, the organization or the work groups. Several dimensions of OCB have been proposed by various researchers (see for example

> **Smith et al., 1983; Van Dyne, Graham, & Dienesch,** 449

1994b). However, the

> **five dimensions of OCB** as **proposed by Organ (1988)** 20

have become widely accepted as they encompass the

> **constructs on extra-role** behaviour **or voluntary** behaviour **proposed in previous studies** 17

(Yoon, 2009). These

> **five dimensions** are: **altruism,** courtesy, **conscientiousness, sportsmanship and civic virtue.** The first two **of** 3

these dimensions, altruism and courtesy, represent Organizational Citizenship Behaviour Interpersonal (OCBI) while the last three dimensions, conscientiousness, sportsmanship and civic virtue represent Organizational Citizenship Behaviour Organization (OCBO) (Coleman & Borman, 2000; Williams & Anderson, 1991). The OCB framework of Organ (1988) encompassing these five dimensions is the only one that has been treated consistently over a fairly large number of studies (LePine et al., 2002) and hence using these dimensions in this study is appropriate. However, instead of the five dimensions, only three of these dimensions - altruism, sportsmanship and conscientiousness - are used. This is because, firstly, in a seminal study, Podsakoff and Philip (1990)

> **revealed that altruism is highly correlated with courtesy (r=0.86),** 3
> implying **that**

using

| | |
|---|---|
| **one of the dimensions is sufficient to describe both of them.** | 3 |

Secondly, LePine et al. (2002) found overlapping of sportsmanship and civic virtue. In addition, both sportsmanship and civic virtue represent Organizational Citizenship Behaviour Organization (OCBO) (Williams & Anderson, 1991). Therefore using one of these dimensions is sufficient to capture the construct. A look at the related literature reveals that many instruments have been used to measure the dimensions of OCB. Each scale has a history of reliable measurement; however almost all of them draw on the work of Organ (1988) for theoretical justifications and adopt with modification the instrument developed by Podsakoff and Philip (1990). The scale used to measure the three dimensions of OCB - altruism, conscientiousness and sportsmanship - in this study was adopted from the seminal study of Podsakoff and Philip (1990). Podsakoff and Philip (1990) are among the first researchers to operationalize the dimensions of OCB given by Organ (1988). In their study, based on the definition of OCB and work of Organ (1988), Podsakoff and Philip (1990) generated a list of items for the construct which were given to 10 of their colleagues for Q-sorting; only those items made it to the final scale on which at least 80% of the judges agreed. These items measured

| | |
|---|---|
| **the five dimensions of OCB** namely **altruism, conscientiousness, sportsmanship, courtesy and civic virtue** | 170 |

as defined by Organ (1988). This instrument has been used in many empirical studies to measure OCB as its reliability and validity are established. However, in this study the exact scale as developed by Podsakoff and Philip (1990) was not used. Instead, the researcher used the scale that was employed in the study by Bell and Menguc (2002). This was owing to the comparative recency of this study and because the questions/items in their study were found to be easier-to-understand, particularly in the context of Malaysia. Bell and Menguc (2002) cite Podsakoff and Philip (1990) as the source of their measurements of OCB dimensions. This researcher compared the scale developed by

| | |
|---|---|
| **Podsakoff and Philip (1990)** with that of **Bell and Menguc (2002).** | 1 |

Clear language differences were noticed. For instance, one of the questions/items in Podsakoff and Philip (1990) scale representing sportsmanship is “(the employee) tends to make mountains out of molehills”. This item in Bell and Menguc’s (2002) scale are asked in an easy-to-understand manner: “(the employee) tends to make problems bigger than they are”. Another example of a difficultly-worded question/item in Podsakoff and Philip’s (1990) scale is “(the employee) is the classic squeaky wheel that always needs greasing”. In Bell and Menguc’s (2002) scale, this item was replaced by “(the employee) constantly talks about wanting to quit his/her job”. Therefore for the purpose of this study, Bell and Menguc’s (2002) scale was chosen with modifications. This was done following the feedback given in the Doctoral Colloquium in December, 2010

| | |
|---|---|
| **at the Graduate School of Business, University of** | 437 |

Malaya. The responses were

| | |
|---|---|
| **assessed on a 7-point Likert scale ranging from**“strongly disagree” **to**“strongly agree”. Twelve (12) **items in** total **and** four (4) **items** each measure **the** | 1 |

three dimensions of

OCB in this study. The items of OCB 465

allowed the respondents (middle and top managers) to evaluate their contact employees on every item. The table below shows the items used to measure the three dimensions of OCB and their sources. Table 3.2: Table showing items measuring Organizational Citizenship Behaviours No. Items Sources

Altruism 1 Help others who have heavy workloads 2 Help 320

others who have been absent 3 Willingly give their time to others who have work-related problems 102

4

Help orient new people even if not required 250

Podsakoff & Philip, 1990; Bell & Menguc, 2002 Sportsmanship 1

Consume a lot of time complaining about trivial matters (r) 2 Tend to make 263

problems bigger than they are (r) 3 Constantly talk about wanting to quit their job (r) 4 Always focus on what is wrong with their situation, rather than a positive side (r) 1 Are always punctual 2 Never take long breaks 3 Do not take extra breaks 4 Conscientiousness Obey company rules, regulations, and procedures even when no one is watching 72

(r): reversed-scored item Podsakoff & Philip, 1990; Bell & Menguc, 2002 Podsakoff & Philip, 1990; Bell & Menguc, 2002 3.5.2 Organizational Culture

Organizational Culture is “a pattern of basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems” (Schein, 2004, p. 17). Organizational Culture 207

has been evaluated along many dimensions and this has resulted in models and theories which are conceptually different but fundamentally similar (Yiing & Ahmad, 2009). In this research the dimensions as proposed by Tsui et al. (2006) are used to capture Organizational Culture in the respondent firms. Tsui

et al.’s (2006) five dimensions of Organizational Culture which are 442

based on the definition of Schien (1992) are:

employee development, harmony, customer orientation, social 2

**responsibility and innovation.** This study uses **the**

measurements of these dimensions as developed by Tsui et al. (2006). Employee development, harmony and customer orientation are measured using five items each while social responsibility and innovation are measured using four items each. In total twenty-three items measure Organizational Culture in this study. All the items are anchored on

**a 5-point Likert scale ranging from**"strongly disagree" **to**"strongly agree". **163**
**The following table shows the**

items measuring the five dimensions of Organizational Culture. Table 3.3: Table showing items measuring Organizational Culture No. Items Source Employee Development 1

**Concern for individual development** 2 **Developing employees' potentials** 3 **Trusting employees** 4 **Caring about employees' opinions** 5 **Providing training in knowledge and skills** **2**

1

**Emphasizing team building** 2 **Supporting cooperative spirit** **63**

Harmony 3

**Promoting feeling/sharing among employees** 4 **Encouraging cooperation** 5 **Consideration among employees Customer Orientation** **2**

1

**Satisfying need of customers on largest scale** 2 **Strongly emphasizing profit of customer** 3 **Providing first-class service** 4 **Customer is number 1** 5 **Providing sincere service** 1 Showing **social responsibility** **2**

Social Responsibility 2

**Mission of the firm is to serve society** 3 **Emphasizing economic as well as social profits** 4 **Encouraging development of society** **2**

1 Ready to accept changes Innovation 2

**Developing new products and services continuously** 3 **Encouraging innovation** 4 **Adopting high-tech bravely** **2**

**Tsui, Wang, and Xin (2006) Tsui, Wang, and Xin (2006)** **175**

**Tsui, Wang, and Xin (2006) Tsui, Wang, and Xin (2006)** 175

Tsui, Wang, and Xin (2006) 3.5.3

**Managerial Ties Managerial Ties are** defined as "executives' boundary-spanning activities and their associated interactions with external entities" **(Geletkanycz & Hambrick, 1997).** Managerial Ties **form a part of social capital or social exchange.** 1

Managerial Ties in this study are measured on three dimensions:

**ties with managers at other firms, ties with government officials** 52

and ties with researchers at universities and other research centers. Following the seminal study of Peng and Luo (2000),

**ties with managers at other firms and ties with government officials** 52
are measured **using**

**a three-item scale** each. **To measure** the **ties with** researchers **at** universities and **other** 52

research centers, this study built on the

**scale developed by** Ramos-Vielba **et al.** (2010) **and used a** 2

three-item scale to capture ties with researchers at universities and other research centers.

**All the responses are assessed on a 7-point Likert scale ranging from**"very little" **to** 1

"very extensive". Thus nine items (9) in all and three items each measure the three dimensions of Managerial Ties in this study. Table 3.4: Table showing items measuring Managerial Ties No. Items Sources Ties with Managers 1

**Managers at** supplier **firms 2 Managers at** buyer **firms** 9

Peng & Luo (2000) 3

**Managers at competitor firms Ties with** 9

Research Centers and Universities 1 2 University researchers for commercialization related to Intellectual Property Rights University researchers for R&D activities and formal consulting work Ramos-Vielba et al. (2010) 3 University researchers for training and transfer of personnel 1 Officials in industrial bureaus

> **Ties with Government Officials** 2 **Political leaders in various levels of** the **government** 35

> **3 Officials in regulatory and supporting organizations such as tax bureaus, state banks, commercial administration bureaus, and the like Peng & Luo (2000)** 35

3.5.4 Open Innovation

> **This study** uses **the definition of** Open **Innovation** as **given by** 48

Vanhaverbeke (2006). According to this definition,

> **Open Innovation is**"the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" **(Chesbrough et al., 2006).** 461

> **Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation in** 86

this study is measured on two dimensions: In-bound Open Innovation and Out-bound Open Innovation. Given that Open Innovation is rather a new concept, there is no standardized scale to measure its dimensions. Therefore this study adapted or modified measurement scales developed by many researchers. Details of the measurements of the two dimensions of Open Innovation are given below. a) In-bound Open Innovation In-bound or

> **outside-in Open Innovation** refers to **the** use **of** 197

discoveries that others make and involves

> **opening up to and** establishing **relationships with external** firms **with the** aim **to access their** 64

competencies in order

> **to enhance the firm's** innovation **performance. To** measure **the** 223

In-bound dimension of Open Innovation, this study used the scale

> **developed by Sisodiya (2008)** and **De Jong et al. (2007).** 1

This scale measures the In-bound dimension of Open Innovation using six items which are anchored

**on a 7-point Likert scale ranging from**"strongly disagree" **to**"strongly agree". **A total of** six **items** **1**

(6) measure this dimension of Open Innovation in this study. Sisodiya (2008) developed measurements for the In-bound dimension of Open Innovation by generating a pool of items after reviewing the related literature on Open Innovation and then presenting those items to industry managers to ensure proper capture of Open Innovation. In addition, inputs from the study of De Jong et al (2007) were used to refine and modify this scale

**to suit the context of this study.** Moreover, **in** **3**

this study instead of anchoring the items

**on a 7-point Likert scale** **147**

as was done by Sisodiya (2008), a 5-point Likert scale

**was used to check common method** bias. **The rationale** for doing this **is** **342**

further explained in Section 3.6.2. b) Out-bound Open Innovation Out-bound or inside-out dimension implies that firms can search for external players that have better fitting business models to exploit and commercialize a particular technology than just depend on internal paths to market. To measure the Out-bound dimension, the scale developed by Lichtenthaler (2009) was used. Four (4) items were used

**to measure this dimension** by capturing **a firm's** willingness **to** **457**

commercialize technological knowledge. Lichtenthaler's (2009) study is among the first studies that operationalized Out-bound Open Innovation quantitatively

**and the validity and reliability of this scale** is **established.** **331**

Although Lichtenthaler (2009) anchored the items

**on a 7-point scale,** in this study, **to** **46**

check common method bias,

**a 5-point scale ranging from**"strongly disagree" **to**"strongly agree" is **used to measure the** **292**

Out-bound dimension of Open Innovation. In addition, as done with respect to the scale measuring the In-bound dimension, inputs from the study of De Jong et al (2007) were used to refine and modify this scale

**to suit the context of this study. In**

all, a total of 10 items measure the criterion variable, Open Innovation in this study. The table below shows the ten (10) items used to measure the two dimensions of Open Innovation, and their sources. Table 3.5: Table showing items measuring Open Innovation No. Items Sources In **3**

**-bound 1 2 3 4 5 6 1 2 3 4** **291**

My organization constantly scans the external environment for inputs such as technology, information, ideas, knowledge, etc. My organization actively seeks out external sources (e. g., research groups, universities, suppliers, customers, competitors, etc.) of knowledge and technology when developing new products. My organization believes it is good to use external sources (e. g., research groups, universities, suppliers, customers, competitors, etc.) to complement our own R&D. My organization often brings in externally developed knowledge and technology to use in conjunction with our own R&D. My organization seeks out technologies and patents from other firms, research groups, or universities. My organization purchases external intellectual property to use in our own R&D. Out-bound Generally, in my organization all technologies are externally commercialized (i.e. sold to outside firms) In my organization,

**external technology commercialization is restricted to technologies that are not used internally** **81**

(r) In my organization,

**external technology commercialization is restricted to relatively mature technologies** **81**

(r) In my organization,

**external technology commercialization is restricted to** non-core **technologies** **81**

(r)

**Sisodiya (2008); De Jong et al. (2007) Lichtenthaler (2009);** **1**

De Jong et al. (2007) (r): reversed-scored item 3.5.5 Regimes of Appropriability Appropriability is defined as the “ability of the owner of a resource to receive a return equal to the value created by that resource”

**(Levin et al., 1987; Teece, 1987). Atkins (1998) defines appropriability as** **1**

“the ability of different stakeholders to retain for themselves the financial benefits that arise through the exploitation of an innovation”. Regimes of Appropriability is the moderating variable in this study. Given the difficulties in measuring appropriability regimes as highlighted in the literature review, this researcher built on the concepts related to appropriability regimes like patents, secrecy and making imitation more difficult for competitors to develop the scale for appropriability regimes. Levin, Klevorick, Nelson, and Winter (1983) pioneered the development of measures for appropriability regimes which has had significant influence on all subsequent studies on this topic. In this backdrop,

**Levin et al (1987) identified six alternative mechanism that firms use** **1**

**to appropriate the returns of innovative activities:** (1) **patents to prevent duplication,** (2) **patents to secure royalty income,** (3) **secrecy,** (4) **lead time,** (5) **moving quickly down the learning curve, and** (6) **sales or service efforts. Almost all the empirical studies on appropriability regimes revolve around these six alternative mechanisms**

of appropriating returns of innovation activities.

**Therefore many past studies were consulted to develop measures of this variable. This variable is thus measured after consulting many empirical studies and by building on many scales (Cohen & Walsh, 2001; Harabi, 1992; Harabi, 1995; Hurmelinna et al., 2007; Levin et al., 1987; Levin, 1988). A total of six items are used to measure this variable on a** 5 **-point Likert scale ranging from "least effective' to** 1

"most effective". The table below shows the six items measuring Regimes of Appropriability and their source. Table 3.6: Table showing items measuring Regimes of Appropriability No.

**Items Sources 1 2 3 4 5 6** 433

Regimes of Appropriability In your industry, to what extent are patents and other legal mechanisms effective in protecting against imitation

**of new or improved products?** In your industry, **to what extent** 68

are patents effective in securing royalty income? In your industry, to what extent is adopting secrecy effective in protecting

**product and process** innovations? **In** your **industry, to** 200

what extent is being first to market (lead time) effective in protecting

**product and process** innovations? **In** your **industry, to** 200

what extent are Intellectual Property (IP) laws effective in protecting

**product and process** innovations? **In** your **industry, to** 200

what extent is moving quickly down the learning curve effective in accruing benefits of product and process innovations? Cohen and

**Walsh (2001); Harabi (1992,** 1995); **Hurmelinna et al. (2007); Levin et al.(1987); Levin (1988)** 1

3.6 Questionnaire Design A researcher can choose to have the questionnaires filled up by telephone, by snail-mail, by email or in person (Hair et al., 2007; Malhotra, 2004; Zikmund, 1997). This study used the

latter two methods - email and personal administration - to collect the data due to the feasibility of these two methods. Therefore, firstly a questionnaire was designed and hardcopies of the same, to be administered in person, were printed in the booklet format. Secondly, Malhotra (2004, p. 361) mentions that the use of the Internet increases response rate to surveys because the Internet provides easy of access to the respondents and makes it easy for them to complete the survey in multiple sessions if necessary. In view of this, an online version of the questionnaire was also designed using KwikSurveys, a free online survey tool. This website offers the ability to generate unlimited number of links to the same questionnaire so that a different link can be sent to the respondents of each firm – thereby helping in tracking the responses. Both the printed

> **version and** the **online version of the questionnaire were** replicas **of** **182**

each other. 3.6.1 Sections of the Questionnaire The questionnaire used in this study, both the printed and the online version, had five (5) sections. The first section sought information with respect to the first predictor variable, Organizational Citizenship Behaviour. The second section asked questions about the moderating variable of this study, Regimes of Appropriability. The third section contained questions related to the second predictor variable Organizational Culture and the criterion variable Open Innovation. The fourth section asked questions about the third predictor variable, Managerial Ties. The fifth section sought demography-related information: type of industry, respondent position, respondent tenure in the firm, age of the firm, whether the firm has an R&D department, firm's market, firm ownership, number of employees and annual revenue. A text box asking for any general comments was also included at the end of the questionnaire. In addition, the first page of the questionnaire acted as the cover letter, inviting respondents' response and explaining the purpose of the research besides giving the contact details of the researcher. Please refer to

> **Appendix A for** a full **copy of the** questionnaire **used in** this **study.** **179**

3.6.2 Precautions

> **for Common Method Bias and Common Method Variance** **232**

Method biases are

> **one of the main sources of measurement error which threatens the validity of conclusions about** the **relationships between** **103**

variables being tested (Nunnally, 1978). In this regard, common method bias (CMB) and common method variance (CMV) have often been cited as a cause of

> **concern in organizational research (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).** **32**

According to Meade, Watson, and Kroustalis (2007), while

> **CMB refers to the degree to which correlations are altered (inflated) due to a methods effect** **32**

while

> **CMV implies that variance in observed scores is partially attributable to a**

**methods effect.** 32

There are several sources of CMB and CMV.

**Podsakoff et al. (2003)** evaluated **the** relevant **literature and identified** the sources **of** 32

method biases and grouped them into four categories: a) a common rater, b) **item characteristic effects (e. g., item ambiguity),** c) **item context effects (e.g., priming effects, grouping of items), and** d) **measurement context effects.** 32

Keeping this in mind and to reduce methods effects, several precautionary measures were taken in this study (right) from the questionnaire designing stage to reduce any potential effects of CMB and CMV and thus ground was prepared for obtaining valid findings. The steps are: 1. In the first section of the questionnaire, six (6) psychological separators were inserted between the real questions of interest. Hence in total the first section contained 18 questions (12 real + 6 psychological separators). 2. In the third section, four (4) psychological separators were inserted between the real questions. Besides, the third section contained the questions/items representing two constructs namely Organizational Culture and Open Innovation. The items of these two variables and the 4 psychological separators were jumbled up. Thus thirty- seven (37) questions/items (Organizational Culture + Open Innovation + psychological separators = 23+10+4) formed the third section of the questionnaire used in this study. 3.7 Validity and Reliability Assessment of Questionnaire 3.7.1 Assessment of Questionnaire Validity

**Validity refers to the degree to which instruments truly measure the constructs which they are intended to measure. If the measures used in a discipline have not been demonstrated to have a high degree of validity, that discipline is not a science (Peter, 1979).** 71

While acknowledging the multitude of definitions of content validity in the literature, Haynes, Richard, and Kubany (1995) state that most of those definitions consider

**content validity as the degree to which elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose.** 129

**Content validity** thus **relates to**"the representativeness or sampling adequacy of the questionnaire regarding the content or the theoretical construct to be measured" **(Cavana,** Delahaye, & Sekeran, **2001,** p. 238). In **this** 471

study, content validity of the questionnaire was tested in two ways as recommended by Cavana et al. (2001). First, all the items that measured the

**variables of interest** in **this study were taken from** 218

past research after studying the evolution of those variables. Most well-known measurements were used for

the variables. Despite this, additional validity assessment was felt needed for two reasons: one, because variables in this study were never before used together in such a combination; two, because the scale for the criterion variable Open Innovation was never before used in the Malaysian context. Therefore, content validity was further assessed by identifying through literature review five experts in Open Innovation research, and later by emailing the scale of Open Innovation (for both In-bound and Out-bound dimensions) to them for face validity. Two out of these five experts, Prof. Dr. Ulrich Lichtenthaler, Chair-holder of

**Management and Organization at the University of Mannheim, Germany,** 196

and Assoc. Prof. Dr. Mattia Bianchi,

**Assistant Professor of Business Administration at the** Stockholm School **of** Economics, **Sweden,** 201

replied. These two researchers have published a significant number of papers

**on the topic of Open Innovation in** many top-tier **journals.** 80

Prof. Dr. Ulrich Lichtenthaler validated the scale as good and Assoc. Prof. Dr. Mattia Bianchi suggested making the items more symmetric (reverse-scored) for both the dimensions of Open Innovation. This suggestion by Assoc. Prof. Dr. Mattia Bianchi was not incorporated because non-symmetric measures have been used in the literature to measure the two dimensions of Open Innovation. In addition, making the measurement items symmetric would go against the suggestion of Malhotra (2004, p. 296) who recommended use of dual statements (some of which are positive and the others negative) in case the questions are worded as statements to which respondents indicate their degree of agreement or disagreement. Furthermore, Prof. Dr. Ulrich Lichtenthaler, whose scale is used in this study to measure Out-bound Open Innovation, did not refer to making the scales for the two dimensions symmetric in his email. As far as the content of the items measuring the two dimensions of Open Innovation is concerned, both the experts face-validated it positively. Correspondence with these two experts is enclosed in Appendix B. Figure 3.1: Evaluation of a multi-item scale Source: Malhotra (2004, p. 266) 3.7.2 Assessment of Questionnaire Reliability For measures to be valid (that is, have validity), “a necessary (but not sufficient)” condition is that they be reliable.

**Reliability is defined as the degree to which measures are free from error and therefore yield consistent results.** 3

**There are three** different **methods for assessing reliability of a measurement scale: test-retest, internal consistency and alternative forms** 193

(Peter, 1979). Internal consistency is the most common method of assessing reliability of a scale and it draws on the homogeneity of a set of items and

**is expressed as a number between 0 and 1** 33

(Hair

> et al., 2010). Appropriate for the purpose of this study, 223

> internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test. 33

Cronbach's coefficient alpha (Cronbach, 1951) provides

> a measure of the internal consistency of a test or a scale 33

(Tavakol & Dennick, 2011) and

> is the most commonly accepted formula for assessing the reliability of a measurement scale with multi-point items (Peter, 1979). 174

> Cronbach's alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct (Santos, 1999). 144

Tavakol and Dennick (2011) mention that, to ensure reliability,

> internal consistency should be determined before a test is employed for research or examination purposes. 33

Therefore,

> this study used Cronbach' s α to assess the reliability of the 121

measuring instrument. To this end,

> a pilot study was conducted prior to approaching the'real' respondents of the study for their response. The 98

pilot-testing exercise, including its outcome, is described in detail in the next section. 3.7.3 Pilot Test Questionnaire design is only one step in the process that ultimately leads to generating answers to research questions of interest. After the questionnaire is designed, researchers should run a pilot test of the questionnaire to make sure it is understandable and acceptable to the intended audience (Olsen & George, 2004). According to the Oslo Manual (2005),

> when designing the questionnaire for an innovation survey, the questionnaire should be tested before it is used in the field. This pre-testing 5

of the questionnaire, which may

include interviewing a group of managers or experts concerning their understanding of the draft questionnaire or sending the questionnaire to a small sample of units, can be valuable in improving the quality of the questionnaire 51

and can help in identifying and eliminating potential problems (Malhotra, 2004, p. 301). The process of pilot-testing ideally involves administering the questionnaire to a small group of persons. This helps in eliciting feedback on various aspects of the questionnaire, such as wording of the questions, whether the respondents understood the questions, whether the respondents felt comfortable answering them, whether the questionnaire was too long, potential barriers to getting good responses etcetera. Pilot testing also evaluates other attributes like precision (reliability) and accuracy (validity). Reliability and validity are critical in developing a questionnaire which has the attributes of result reproducibility and good measurement of the phenomena of interest. After incorporating feedback from the pilot test, the questionnaire becomes ready for administration to the target respondents (Olsen & George, 2004). In addition, to the best of this researcher's ken, no previous research exists on Open Innovation in the Malaysian context. Hence, although most of the scales used in this study have high reliability in other contexts, the modification of the scale by this researcher and the integration of scales from different studies may affect the reliability of the newly-developed instrument used in this research. Therefore keeping this in mind,

a pilot-test was conducted before distributing the questionnaire on a 143

full scale. Questionnaires were distributed among students from three faculties of the University of Malaya namely:

Faculty of Computer Sciences, Faculty of Engineering and Faculty of Business and 221

Accountancy. Constraints were applied and only the post-graduate students with previous work experience were targeted. From the Faculty of Business and Accountancy, only the MBA students were administered the questionnaire. MBA students have been used successfully for pretests for firm level research in many studies (for instance: Atuahene-Gima & Murray, 2004; Frels, Shervani, & Srivastava, 2003; Sisodiya, 2008). Frels et al. (2003) followed a similar path and subjected their initial questionnaire to IT professionals enrolled in an executive education class to improve reliability of their instrument. This pilot study used an online questionnaire to seek responses with respect to the variables of interest. Respondents were required to click radio buttons to record their answers. However for some questions text boxes were made available to record responses. A text box asking for any general comments was also included in the questionnaire. A total of sixty-three (63)

responses were received. The responses were analyzed and the feedback was used 451

to improve the final questionnaire. Following is a summary of the changes that

were made based on the feedback to improve the final version of the questionnaire which was 182

later administered to 'real' industry respondents. a) Respondents indicated that the instruction for answering the questions related to Regimes of Appropriability were not clear. Changes were made and the new instruction read: "Please indicate the extent to which the following mechanisms are effective in safeguarding

innovations in your industry". b) Respondents indicated that from the firm profile questions, two questions about the size of the company (one, revenue in Malaysia; second, number of employees in Malaysia) were ambiguous and double-barreled. This issue was addressed by re-phrasing and separating the two questions into four questions, making the questions clearer and in line with the recommendations provided by Malhotra (2004, p. 284). c) Respondents indicated that providing an option to tick one of the four industry types would be preferable rather asking them to write name of the industry themselves – this change was also made. Apart from the above, the respondents did not report any issues in answering the questionnaire. The data thus collected from the respondents of the pilot study were entered into SPSS® v.16 and analyzed for

**reliability of** measurements. **The** table **below shows the reliability** assessment **of the** 334

variables of this study.

**As can be seen, Cronbach's alpha for all** the variables is **above** 194

the .60 threshold, thus confirming reliability of the measurements

**used in this study (Hair et al.,** 2010). It **is** therefore safe **to** 95

conclude that the instrument that is going to be used in this study has no problems in terms of reliability and the researcher can proceed administering the instrument to the 'real' respondents. Table 3.7: Reliability assessment of variables S. No Variable No. of items Cronbach's α 1 Organizational Citizenship Behaviour 12 0.690 2 Organizational Culture 23 0.711 3 Managerial Ties 9 0.826 4 Regimes of Appropriability 6 0.839 5 Open Innovation 10 0.818 3.8

**Data Analysis** Techniques **The data** collected **for this study were analyzed** 344

quantitatively. As mentioned earlier, this study has three predictor variables, one criterion variable and a moderating variable. In addition, the respondents

**were asked to answer** some **questions related to** firm profile (type **of** industry, respondent position **in the** 68

firm, respondent tenure with the firm, age of the firm, firm's market, firm's ownership, number of employee and yearly revenue of the firm). To analyze the data related to all these variables, several statistical techniques were used. IBM SPSS® Statistics v.20 and

**Analysis of Moment Structures** v.18 **(AMOS™) were used** to run **the** 143

relevant statistical tests. The next section provides a brief over-view of the main data analysis techniques used in this study. 3.8.1

**Exploratory Factor Analysis** Exploratory **Factor Analysis** (EFA) **is an interdependence technique used to** 169

> **define the underlying structure among the variables in the analysis.** 299

EFA

> **provides the tools for** analyzing **the structure of the interrelationships among a large** numbers **of variables by defining sets of variables that are highly interrelated, known as factors (Hair et al.,** 27

2010). Thus EFA

> **is used to reduce a number of** items **to a** lesser **number of factors.** 283

The factors thus obtained act as building blocks and can be used in several statistical analyses to establish relationships. In the current study, EFA was used to establish dimensionality of items/questions and reduce those items (of the variables) to factors.

> **Therefore the main purpose of** using EFA in **this study is to** reduce **the** 317

data by creating an entirely new set of variables, small in number, which replace and represent the original items/questions

> **(Hair et al., 2010,** p.99). **This study** uses **the** Bartlett test **of** 7

sphericity to determine whether EFA is appropriate for the data of this study. The Bartlett test of sphericity checks

> **the presence of** correlation **among** the **variables** and **provides the statistical** significance **that the correlation matrix has significant correlations among at least some of** the **variables.** The **Bartlett test of sphericity** 139

however has a drawback in that as the sample size increases, it becomes more sensitive in detecting correlations among the variables. Keeping this in mind, this study also uses the Kaiser-Meyer-Olkin (KMO). The KMO measures the sampling adequacy and quantifies the degree of inters-correlation among the variables and the appropriateness of EFA. The KMO is interpreted as per the

> **following guidelines: .80 or above, meritorious; .70 or above middling;** 0.60 **or above, mediocre; .50 or above, miserable; and below** .5, **unacceptable. The** 166

results obtained in EFA are used to guide the confirmatory factor analysis (CFA). Post CFA, the confirmed latent variables/factors are used in establishing

> **relationships among the variables of interest in this study.** 202

The next section briefly explains the CFA and structural equation modeling. 3.8.2 Structural Equation Modeling and Confirmatory Factor Analysis 3.8.2.1 Structural Equation Modeling Structural equation modeling

> **(SEM) is a** powerful **statistical** technique **that takes a confirmatory approach to the analysis of a structural theory bearing on some phenomenon.** According to **Byrne** 168

(2001), SEM involves two important aspects: a) the

> **causal processes under study are represented by a series of structural (regression) equations, and b)** the **structural relations** in the model **can be** shown **pictorially,** enabling **a clearer conceptualization of the theory under study.** 123

In SEM, a hypothesized model developed by the researcher is compared against the data that is gathered in the field.

> **If the goodness-of- fit is** found to be **adequate,** plausibility of **the** 3

relations depicted in the model is claimed. If adequate goodness-of-fit is not achieved, the tenability of the relations in the model is rejected. SEM is considered as a second generation multivariate technique which takes a confirmatory approach to data analysis as opposed to the exploratory approach. It consists of confirmatory factor analysis, regression and path analysis. This technique scores as compared to the older techniques which could not assess or correct for measurement error, in that

> **it provides explicit estimates of** these **error variance parameters.** 160

In addition, the older data analysis methods relied on observed measurements only, whereas SEM procedures can include unobserved (latent) as well as observed variables. SEM also provides relatively easy solutions

> **for modeling multivariate relations, for estimating point or interval indirect effects.** All **these features** have made **SEM** 160

increasing popular for non- experimental research (Byrne, 2001). Kline (2005) mentions that structural equation modeling uses two types of analytical procedures to assess and validate the model: the first one being the confirmatory factor analysis (CFA) which determines the set of observed variables that share common variance characteristics to identify the latent variables (factors); and the second one being the regression analysis which is run to establish

> **relationships among the latent variables. To** establish **the** strength of the **model,** certain goodness-of **-fit** 363

measures are used which fall into three categories: comparative fit of the data to a base model, model parsimony and the overall fit. Many statistics can be used in AMOS™ to assess the hypothesized model and if a good fit is not found between the model and the data, AMOS™ can as well provide suggestions for modification of the model. 3.7.2.2 Confirmatory Factor Analysis SEM in essence

**is a combination of factor analysis and multiple regression.** 128

The model based on multiple regression is called the structural model, while the model based on (confirmatory) factor analysis is called the measurement model. The variables in SEM are: measured variables also known as observed or manifest variables, and factors also called latent variables. The measurement model relates the

**measured variables to** the **latent variables** while **the structural model** relates **the latent variables to one another. In this study,** 128

the researcher used the measurement model portion (i.e. CFA) of SEM only.

**CFA is used to validate the proposed measurement model.** 3

Guided by

**the results of the exploratory factor analysis** (EFA), **the** 405

researcher will specified a measurement model and shifted to a confirmatory mode by specifying which indicators/items define each construct/factor (Hair, Anderson, Tatham, & William, 1998, p. 598). CFA is a way of testing how well measured variables represent a smaller number of constructs.

**Hair et al. (2010, p.** 693) mention **that** CFA **is** similar **to** 78

EFA in some ways, but the philosophy is “quite different”. CFA determines the set of observed variables that share common variance characteristics to identify the constructs or latent variables (Kline, 2005). CFA requires specification of the

**number of factors** that **exist for a set of variables and** which factors **each variable will load on before** results **can be computed.** In this way, **it** 7

is the researcher (and not the statistical technique) that assigns the variables to the factors based on the theory being tested. CFA is then run to test the extent to which a researcher’s a-priori, theoretical

**pattern of factor loading on pre-specified constructs** represents **the** 7

actual data. In other words, model fit is assessed. CFA confirms the measurement theory which specifies how the measured variables “logically and systematically”

**represent constructs involved in the theoretical model.** 7

The measurement theory is then combined with a structural theory to fully specify a SEM model (Hair et al., 2010). CFA results in combination with construct validity tests

**provide a better understanding of the** quality **of the** 219

measures being used (Hair et al., 2010). In addition,

> **CFA assesses the measurement model by examining the unidimensionality, reliability and validity** 3

of the constructs including convergent validity (correspondence or convergence between similar constructs) and discriminant validity (discrimination between dissimilar constructs) (Garver & Mentzer, 1999). The measurement model in

> **this study is evaluated using multiple fit criteria.** 3

> **This is in line with Hair et al.** (2010, p. 644) **who** suggested **that** 300

using at least three to four fit indices provides adequate evidence of model fit. These authors suggest against reporting all the goodness-of-fit indices in view of redundancy and recommend reporting

> **at least one incremental index and one absolute index in addition to** Chi-square statistic **(χ 2 ) and associated degrees of freedom.** 3

Therefore following Hair et al. (2010, p. 644), this study used

> **χ 2** values **and degrees of freedom, the CFI and the RMSEA** 3

to evaluate the measurement model. 3.8.3 Hierarchical Multiple Regression According to Hair et al. (1998, pp. 148-149),

> **multiple regression is a statistical technique that** is **used to analyze the relationship between a single** criterion **variable and several** predictor **variables; the** 28

objective being to use the predictor variable with known values to predict the single criterion variable. This study uses hierarchical multiple regression for hypothesis testing. Sometimes also called sequential regression, hierarchical multiple regression is chosen because this technique tests with logic and ease the hypotheses of this study and answers the objectives. In hierarchical multiple regression, the predictor variables are entered into the model/block in the order specified by the researcher based on theoretical grounds. The variables or sets of variables are entered in steps with each predictor variable being assessed in terms of what it contributes to the prediction of the criterion variable after the variables in the previous step have been controlled for (Hair et al., 1998, pp. 148-149; Pallant, 2007, p. 147). In this study, the criterion variable, Open Innovation, has two dimensions: In-bound Open Innovation and Out-bound Open Innovation. Therefore to assess contribution of the predictor variables in predicting both the dimensions of the criterion variable, two separate hierarchical multiple regressions are conducted

> **to test** all **the hypotheses. In** addition, **this study** also **seeks to** 99

test whether Regimes of Appropriability

> **moderates the relationships between the** dimensions of **the** predictor 452

**variables** and **the**

criterion variables (In-bound and Out-bound Open Innovation). This is tested again using hierarchical multiple regression.

**Following the procedure** delineated **by Baron and Kenny (1986),** **8**

interaction terms

**(as shown in Figure 3.2)** between all **the** dimensions **of the** **101**

predictor variables and the moderating variable are created and introduced in the regression model. Figure 3.2: Moderator Model Source: Baron and Kenny (1986, p. 1174) 3.9

**Summary This chapter discussed the research design of** this **study.** **189**
Philosophical moorings **and**

research approach taken in this study were highlighted. Further, sample, target population, sampling method, sampling constraints, sampling frame and procedures and sample size were also discussed. Questionnaire design was discussed and the

**validity and reliability of the questionnaire were** established **through** **189**

expert judgement and pilot test, respectively. Following a brief discussion on measurements of the constructs, the

**data analysis** techniques **used in this study** were also **discussed.** In **the** **163**

next chapter, analysis of the data is presented. The data is first prepared following which descriptive statistics are presented. This is followed by

**exploratory factor analysis (EFA) and confirmatory factor analysis** **27**
**(CFA).** Later, validity – convergent **and**

discriminant – is checked. Finally, the

**hypotheses are** tested **to** answer **the research questions** of **this study.** **397**

CHAPTER FOUR DATA ANALYSIS 4.0

**Introduction This chapter presents the** exercise **of data analysis and** **115**
provides **the** findings **of this** study. **The** first section **of**

this chapter deals with coding of the data, reverse scoring of negatively- worded items, and missing values. In the second section, descriptive statistics are presented, giving a summary of the

**demographic profile of the respondents** and the firms **that participated in this study.** In **the** 105

third section, multivariate assumptions including

**normality, outliers linearity, homoscedasticity and multicollinearity are** looked at. **The** 3

fourth and the fifth sections of this chapter show the results of the tests for non-response

**bias and common method bias** respectively. **In the** sixth **section,** 215

purity of the scales used in this study is assessed using item

**-total-correlation and Cronbach's alpha. The** seventh section presented **the** 214

results of

**exploratory factor analysis** conducted **on all variables** of this study. **In the** 80

eighth section, the

**results of the** exploratory **factor analysis** with **the**'offending' **items** dropped **are** presented. **In the** 305

ninth section, reliability of the scale without the 'offending' items is examined. The tenth section deals with confirmatory factor analysis and construct validity including discriminant validity and convergent validity. In the eleventh

**section of this chapter, the** results **of** cluster **analysis** performed **on the** 130

dimensions of Organizational Culture are presented. This section is followed by the twelfth section in which hypotheses of this study are tested. 4.1 Data Preparation Following data collection using the questionnaire survey method, the data were readied for data analysis. As mentioned in the previous chapter, this study used SPSS ® v.20 and AMOS ™ to analyze the data. However before analyzing the data, the data were entered into SPSS ® . The data coding procedures as suggested by Sekaran (2006) were followed. The data were coded as show in Table 4.1 below. 4.1.1 Coding of Data Table 4.1: Table showing coding of data Item Categories Code Type of industry Respondent position Respondent years in firm Firm's market Firm ownership Company age Aerospace Computers Electronics Pharmaceuticals Middle Management Top Management

**5-10 years 11-15 years 16-20 years** Above **20 years** 159

Local / National Regional Global

**Publicly owned Privately owned State owned Foreign ownership** 212

Mixed ownership/ Joint venture

**1-10 years 11-20 years 21-30 years 31-40 years Above** 127

50

**years 1 2 3 4 1 2 1 2 3 4 1 2 3** 248

1 2 3 4 5 1 2 3 4 5 Table 4.1: Table showing coding of data (continued) Number of employees Annual revenue (RM)

**Organizational Citizenship Behaviours Organizational** Culture **and Open Innovation** Managerial Ties Regimes **of** 1

Appropriability Less than 100 101-500 501-1000 1001-5000 Above 5000 Less than 200,000 200,000 -500,000 500,000-1mil 1mil- 5 mil 5mil-10mil 10-mil-25mil 25 mil-above

**Strongly Disagree Disagree Disagree** Somewhat **Neutral Agree** Somewhat **Agree** Strongly Agree **Strongly Disagree Disagree Neutral Agree Strongly Agree** 151

Very Little . . . Very Extensive Least Effective Less Effective Somewhat

**Effective Effective** Most **Effective 1 2 3 4 5 1 2 3 4 5** 260

6 7 1 2 3 4 5 6 7 1 2 3 4 5 1 . . . 7 1 2 3 4 5 4.1.2 Reverse Scoring Items Some of the questions/items in the questionnaire were negatively-worded. Four (4) such items representing Sportsmanship dimension of the Organizational Citizenship Behaviours Construct and three (3) items measuring Out-bound Open Innovation were negatively asked in the questionnaire. Hence these 7 items were reverse-coded using the “Recode” function in SPSS ® v.20 so that all the questions became uni-directional. 4.1.3 Dealing with Missing Values The Oslo Manual (2005, pp. 126-127) states that

**responses to innovation surveys are always incomplete, irrespective of the survey method used.** 5

Striking a similar note, Hair et al. (1998, pp. 46-47) mention that missing data are “a fact of life” in multivariate analysis.

**Two types of missing values** exist: **item and unit non-responses.** While **unit non-response** refers to **a reporting unit not** replying **at all,** 51

the

**item non-response refers to the response rate to a specific question** 5

**and is equal to the percentage of blank or missing answers among the reporting units. Item non-response rates are frequently higher for quantitative questions than for questions using binary or ordinal response categories**

(Oslo Manual, 2005, pp. 126- 127). Hair et al. (1998, p. 47) mention that from a substantive perspective, any statistical results based on data with a nonrandom missing data process could be biased. On the other hand, the practical impact of missing data is the reduction of sample size available for analysis. A researcher therefore needs to remedy the missing data to have accurate statistical results. There are several techniques of dealing with the missing values. One way is to use the complete case approach in which observations with complete data only are considered for data analysis. The second way is to delete the 'offending' variable/s. Another remedy for missing values is to use one of the imputation methods available

**(Hair et al., 1998,** pp. 51-54). **In this study, the** complete case approach **was** used **to** **310**

remove the missing values in the data, that is, only the observation with complete data were used for data analysis. As mentioned in the previous chapter, 366

**questionnaires were collected for this study.** However, upon examination **of** the **questionnaires,** **446**

twenty-seven (27) questionnaires were found to be incomplete; these 27 questionnaires were discarded and thus a total of 339 missing value-free questionnaires were left. In addition, the

**open-ended question at the end of the** questionnaires failed **to** **45**

elicit any mention-worthy response from the respondents. Moreover, a few respondents evinced

**interest in receiving a copy of** research findings **of this** **423**

study – such respondents will be appropriately emailed copies of the research papers that emerge from this research exercise.

**4.2 Descriptive Statistics** Frequency **and** percentage distributions **were obtained for all** the demographic **variables** **301**

of this study. These descriptive statistics are tabulated

**in Table** 4 **.2. The table shows that the** **404**

data were collected from respondents working in four high-tech industries. Majority of the respondents (30.4%) belonged to the Pharmaceutical industry while to the

**Computers and Office Machinery** industry, the **Electronics and Communications** **468**

industry and the Aerospace industry belonged 25.7%, 22.4% and 21.5% respondents respectively. The spread of respondents across the four high-tech industries indicates quite a balanced distribution. This required target respondents for this research needed to be middle and top managers only. In line with this, most of the respondents (54.9%) were at top management positions while roughly half the number of respondents (45.1%) occupied middle management positions. Middle management positions refer to positions from Manager onwards till senior managerial level, while top management positions indicate managers serving in occupational levels that are above senior managers. The table below also indicates that an overwhelming

**majority of the respondents** (64.0%) **who participated in this** **417**

study had served the 'current' organization for 5-10 years. One of the sampling constraints applied in this study required the respondents to have served for at least 5 years in the 'current' organization and all the respondents of this study are well above this threshold. In addition, 28% of the respondents had worked in the same firm for 11-15 years while 7.1% and 0.9% had served for 16-20 years and above 20 years

**respectively. With respect to the** market **of the** firms surveyed, a **majority** **19**

42.2% operated globally while 31.9% and 26% operated regionally and locally respectively. Regarding the ownership of the firms surveyed, 47.5% were privately-owned, 32.4% had foreign ownership, 7.7% were publicly-owned, another 7.7% had mixed ownership while 4.7% were state-owned. Managers working in firms of different (firm) age groups participated in this study. Nearly half of the firms (45.1%) surveyed for this study had been operating for 11-20 years while 25.7%, had been operating for 21-30 years, 21.2% for 31-40 years, 6.5% for 1-10 years and a minuscule 1.5% for above 50 years. These statistics indicate that most of the firms surveyed had been in business for quite long and thus knew the market reasonably well.

**As far as the size of the** surveyed firms **is concerned,** **357**

it was measured using two questions: number of employees and revenue of the firm. Regarding the number of employees, the majority (40.4%) had 101-500 employees while 35.7% of the firms had 501-1000 employees. Only 15.3% of the surveyed firms can be considered small with less than 100 employees, while 7.7% and 0.9% of the firms were quite large with 1001-5000 and above 5000 employees, respectively. Size of the firms was also gauged in terms of the annual revenue in Ringgit Malaysia (RM). As Table 4.2 below shows, most of the firms (40.7%) earned revenue between RM 10-25 million, while 19.5% of the firms earned revenue of RM 1-5 million. 16.8% of the firms earned revenue of RM 25 million and above, 10.3% earned between half a million RM and one million, 7.1% earned RM 5-10 million, 3.8% earned RM 2000, 000 - 500,000 while a minority 1.8% of the surveyed firms earned revenue of less than RM 200, 000. Table 4.2: Showing characteristics of the sample Categories Frequency Percent Cumulative Type of industry Aerospace Computers and Office Machinery Electronics and Communications Pharmaceuticals 73 87 76 103 21.5 25.7 22.4 30.4 21.5 47.2 69.6 100 Respondent position Middle Management Top Management 153 186 45.1 54.9 45.1 100 Respondent years in firm

**5-10 years 11-15 years 16-20 years** Above **20 years** **159**

217 95 24 03 64.0 28.0 7.1 0.9 64.0 9.0 99.1 100 Firm's market Local / National Regional Global 88 108 143 26.0 31.9 42.2 26.0 57.8 100 Firm

**ownership Publicly owned Privately owned State owned Foreign ownership** **212**

Mixed ownership/ Joint venture 26 161 16 110 26 7.7 47.5 4.7 32.4 7.7 7.7 55.2 59.9 92.3 100.0 Company

age

**1-10 years 11-20 years 21-30 years 31-40 years Above** 50 **years** **127**

22 153 87 72 05 6.5 45.1 25.7 21.2 1.5 6.5 51.6 77.3 98.5 100.0 Number of employees Less than 100 101-500 501-1000 1001-5000 Above 5000 52 137 121 26 03 15.3 40.4 35.7 7.7 .9 15.3 55.8 91.4 99.1 100 Annual revenue (RM) Less than 200,000 200,000 -500,000 500,000-1mil 1mil- 5 mil 5mil-10mil 10-mil-25mil 25 mil-above 6 13 35 66 24 138 57 1.8 3.8 10.3 19.5 7.1 40.7 16.8 1.8 5.6 15.9 35.4 42.5 83.2 100.0 4.3 Multivariate Assumptions Meeting certain multivariate assumptions is critical to successful data analysis. According to Hair, Black, Babin, and Anderson (2010, p. 68), data should be tested for compliance with the statistical assumptions of multivariate techniques to lay foundation for making proper statistical inferences and results. These authors mention that meeting the assumptions in multivariate analysis is important due its two characteristics: a) complexity of the relationships,

**owing to the** typical use **of a large number of** **45**

variables, makes the potential distortions and biases more potent when the assumptions are violated, particularly when the violations compound to become even more detrimental than if considered separately; and b) complexity of the analyses and results may mask the indicators of assumption violations apparent in the simpler univariate analyses. In view of the above, to obtain statistically accurate findings, the researcher must ensure that the multivariate assumptions are not violated. In the next sub-section, the multivariate assumptions of the data of this study are evaluated. 4.3.1 Normality, Linearity and Homoscedasticity Hair et al. (1998, pp. 70-71) highlight that the most important

**assumption in multivariate analysis is normality which refers to the shape of the data distribution for individual metric variable and its correspondence to normal distribution.** **140**

Normality of means a symmetrical and bell shaped distribution of data. The easiest way to test normality is a visual check of the histograms. A look at the histograms obtained for the variables of this study reveals that the data are normally distributed. However, testing for normality using histograms could sometimes be problematic. Therefore a more reliable way of testing for normality is normal probability plots. A look at the

**normal probability plots** of **the** variables **of the** study indicates **that** **469**

the data are normally distributed.

**In addition, the sample size of this study is** 339 **which** **321**

is quite large and greater than 200, implying that the detrimental effect of non- normality in this study cannot be more than negligible (Hair et al., 2010, p. 70). Moreover, a visual inspection of the graphical plots was conducted to check whether the data meets the assumptions of homoscedasticity and linearity. Homoscedasticity

**refers to the assumption that the** criterion **variable** exhibits **equal** levels **of variance across the range of predictor variables (Hair et al.,** **183**

1998, pp. 73). This visual inspection of the

**graphical plots** did **not** reveal **any pattern of non-linearity** (i **.e. the dots are**

> **far** away **from a** linear **line relationship)** or **heteroscedasticity** (i.e. **the dots are not concentrated in the** centre **but spread out across the** scatter plot **graph).** 3

Therefore, there is evidence of linearity and homoscedasticity between the criterion and predictor variables of this study. Graphical plots are attached in Appendix C. 4.3.2 Outliers According to Hair et al. (1998, pp. 64), “outliers are observations with a unique combination of characteristics identifiable as distinctly different from the other observations”. Just like the missing values can distort statistical findings, the outliers present in the data can as well lead to misleading statistical findings. The causes of outliers present in the data can be divided into four classes. Firstly, outliers may

> **arise from procedural error such as data entry error or** a **mistake in coding.** 27

Secondly, outliers can be present in the data due to

> **an extraordinary event, which** explains **the uniqueness of the observation.** 27

Thirdly, the presence of outliers in the data may be inexplicable. Fourthly, outliers may contain

> **observations that fall within the ordinary range of values** on **each of the variables but are unique in their combination of values across the variables** 149

(Hair et al., 1998, pp. 64-65). Whatever the reason for the presence of outliers in the data, a researcher needs to deal appropriately with the outliers that can bias the statistical findings. With regard to the data of this study, graphical plots were visually examined to look for any outliers

> **and no extreme outliers** were **found as all** the **cases** 3

were found to be generally within the specified residual range of 3.3 to -3.3 (Hair et al., 1998). Graphical plots are attached in Appendix C. 4

> **.3.3 Multicollinearity Multicollinearity is the extent to which a variable can be explained by the other variables in the analysis.** 167

In other words, it refers to the high inter-correlations among the predictor variables. Multicollinearity complicates the interpretation of the results as it becomes difficult to ascertain the effect of any single variable because of their interrelationships. Therefore, it becomes important to ensure that no multicollinearity exists among the predictor variables. There are two most popular ways of testing for multicollinearity in the data: a) Tolerance, and b) Variance Inflation Factor (VIF). VIF can be derived from Tolerance by inversing it. According to Hair et al. (1998), multicollinearity exists among the predictor variables

> **when the value of Tolerance is less than 0.10 and** the value for **VIF is more than 10.** 3

Tolerance and VIF can be calculated using SPSS ® v.20 while performing multiple regression. The values for Tolerance and VIF for all the predictor variables of the study

> **are shown in** the **table** below. **As can be seen in Table** 315

4.3, multicollinearity does not seem to be a problem in this study 4 as the value for Tolerance for all the variables is greater

> **than the cut-off point of 0.** 10 **and the** 151

value for VIF is far less than 10.

> **Table 4.** 3: **Tolerance and VIF values** for predictor **variables Collinearity Statistics** Construct Dimension **Tolerance VIF** 3

Organizational Citizenship Behaviours Managerial Ties Organizational Culture Altruism Sportsmanship Conscientiousness Ties with Managers Ties with Research Centers Ties with Govt. Officials Highly Integrative Culture Hierarchy Culture .874 .782 .892 .835 .613 .560 .615 .775 1.145 1.278 1.121 1.197 1.631 1.787 1.627 1.290 Criterion variable: Open Innovation 4.4 Test of

> **Non-response Bias Non-response bias refers to the mistake one expects to make in estimating a population characteristic based on a sample of survey data in which, due to non-response, certain types of survey respondents are under-represented (Berg,** 2010). **Non-** response **to a** questionnaire **survey** 67

can potentially bias the findings of a study because

> **those who do not** respond to **the questionnaires may differ in some** systematic **way** 295

from those who responded (Boström et al., 1993). It is therefore important to investigate and estimate a possible bias as a result of loss of information due to some people not responding to the questionnaire (Sheikh & Mattingly, 1981). In this study

> **non-response bias was examined by comparing** means of **the first and last** 40 respondents **of** 275

this study. To do this,

> **t-test was used** for each variable **to compare the** mean difference **between the two groups,** 296

that is early and late respondents. 4 In addition to this procedure, Pearson Correlation Coefficients were obtained

| | |
|---|---|
| to measure the strength of relationships between all the variables of this | 26 |

study. None of the correlation coefficient values exceeded 0.80, thus ruling out any concern of multicolinearity (Pallant, 2007). Table of Pearson Correlation is attached in Appendix C. The

| | |
|---|---|
| results of the tests, which are shown in Table 4.4 indicate that | 29 |

| | |
|---|---|
| there were no significant differences between the means for the two groups; | 205 |

hence non-response bias in this study is ruled out. Table 4

| | |
|---|---|
| .4: T-test results for differences between early and late | 391 |

respondents Variables First respondents (N=40) Last respondents (N=40) T- statistic Significance Organizational Citizenship Behaviours 57.62 56.37 .642 .523 Organizational Culture 94.22 95.12 -.358 .721 Managerial Ties 44.57 43.40 .608 .545 Open Innovation 38.5 38.75 -.202 .841 Regimes of Appropriability 23.15 23.75 -.775 .441 4.5 Test of Common Method Bias As discussed in Section 3.6.2, method biases lead to problems because they are

| | |
|---|---|
| one of the main sources of measurement error which threaten the validity of conclusions about the relationships between | 103 |

variables being tested (Nunnally, 1978). In this study many efforts were made to reduce common method bias and common method variance (please refer to section 3.6.2). However, it is worthwhile

| | |
|---|---|
| to assess whether common method bias is a problem in this study. | 116 |

Therefore, method bias in this study was assessed

| | |
|---|---|
| using Harman's single factor test | 477 |

that is performed using the exploratory factor analysis (Podsakoff et al., 2003).

| | |
|---|---|
| Harman's single factor test tests if the majority of variance is explained by a single factor. To conduct this | 11 |

test, EFA is performed on all the items with the number of factors constrained to 1 and the unrotated solution is analyzed. In

| | |
|---|---|
| a study that has significant common method bias, | 11 |

| | |
|---|---|
| a single factor will account for majority of the variance | 11 |

(usually more than 50%) in the model. In this study, results of the EFA with number of factors constrained to 1 show no signs of a single factor explaining

majority of the variance. It is therefore concluded that the data is 50

free from common method bias. 4.6 Scale Purification Following the procedure suggested by Churchill Jr (1979), the purity of the scales used in this study is assessed using item-total-correlation and

Cronbach's alpha. This method has been used in the past to purify the 69

scales (e.g. Husin, 2009). The conventional

cut-off point of 0.5 is used and the items with item- 443

total-correlation below this cut-off point are considered weak and thus dropped. In this study, a total of

nine items were found to have item-total- correlation below the 78

cut-off point of 0.5. The items are: OC.EmpDev.1, OC.Harmony.1, OC.CustOrient.4, OC.SocRes.1, MT.Man.3, IBOI.3, IBOI.4, OBOI.2, RA4. The item-total-correlation for OC.EmpDev.1 was .507, which is a borderline case and a decision on whether to drop it or not will be taken later after further

analysis. The results of scale purification are shown below in Table 40

4.5. However before dropping the 'offending' items with low item-total-correlation, the decision regarding such items is re- confirmed by conducting an exploratory factor analysis on the predictor vaiiables of this study. This is explained in the next section. In addition, as Table 4.5 shows the Cronbach's alpha for all the sub-scales was well above the satisfactory point of 0.7; thus confirming reliability of the scales (Nunnally, 1978). Table 4.5: Item

-total-correlation and Cronbach's Alpha for all items Items Mean SD 3
Item-total- Correlation Cronbach's Alpha

OCB.Alt.1 OCB.Alt.2 OCB.Alt.3 OCB.Alt.4 5.48 5.33 5.51 5.34 .895 .826 .949 .891 .735 .633 .688 .672 .845 OCB.Spo.1 OCB.Spo.2 OCB.Spo.3 OCB.Spo.4 4.48 4.39 4.18 4.51 1.575 1.639 1.741 1.636 .769 .844 .800 .768 .909 OCB.Con.1 OCB.Con.2 OCB.Con.3 OCB.Con.4 5.37 5.30 5.37 5.36 .899 .877 .899 .867 .611 .748 .738 .687 .854 OC.EmpDev.1 OC.EmpDev.2 OC.EmpDev.3 OC.EmpDev.4 OC.EmpDev.5 4.19 4.35 4.28 4.20 4.31 .843 .715 .759 .814 .735 .507 .632 .745 .705 .578 .831 OC.Harmony.1 OC.Harmony.2 OC.Harmony.3 OC.Harmony.4 OC.Harmony.5 3.89 4.35 4.31 4.33 4.33 1.316 .728 .773 .712 .751 .411 .628 .681 .576 .609 .768 OC.CustOrient.1 OC.CustOrient.2 OC.CustOrient.3 OC.CustOrient.4 OC.CustOrient.5 4.22 4.19 4.22 4.28 4.23 .678 .654 .661 .792 .657 .577 .598 .617 .364 .589 .769 OC.SocRes.1 OC.SocRes.2 OC.SocRes.3 OC.SocRes.4 4.11 4.03 4.24 4.25 .814 .770 .871 .832 .406 .557 .797 .685 .794 Table 4.5: Item-total-correlation and Cronbach's Alpha for all items (continued) OC.Innov.1 OC.Innov.2 OC.Innov.3 OC.Innov.4 MT.Man.1 MT.Man.2 MT.Man.3 MT

.Res.1 MT .Res.2 MT.Res.3 251

MT.Gov.1 MT.Gov.2 MT.Gov.3 IBOI.1 IBOI.2 IBOI.3 IBOI.4 IBOI.5 IBOI.6 OBOI.1 OBOI.2 OBOI.3 OBOI.4 RA1 RA2 RA3 RA4 RA5 RA6 Items

**Mean SD 4.** 29 **4.** 24 **4.** 35 **4.20 4.** **444**

94 5.01 5.13 4.73 4.88 4.85 4.88 4.91 5.07 4.39 4.31 4.02 3.92 4.19 4.17 4.35 4.04 4.10 4.05 4.27 4.12 4.17 3.70 4.27 4.13 .730 .830 .780 .879 1.423 1.458 1.573 1.426 1.373 1.402 1.332 1.394 1.392 .672 .755 .686 1.26 .774 .781 .768 .813 .920 .935 .891 .968 .943 .879 .851 .874 Item-total- Correlation .658 .725 .746 .638 .573 .677 .479 .664 .774 .744 .598 .704 697 .535 .566 .259 .348 .689 .652 .639 .398 .690 .670 .697 .710 .693 .207 .632 .557 Cronbach's Alpha .849 .745 .854 .814 .740 .786 .814 4.7

**Exploratory Factor Analysis Exploratory Factor Analysis (EFA) was conducted** **361**

using

**Principal Component Analysis as the extraction method and Varimax with Kaiser Normalization as the rotation method** **108**

**to gain a better understanding of the underlying structure of the data (Pitt & Jeantrout, 1994)** and **to** **120**

examine factor loadings of all the items measuring the constructs. Appropriateness of conducting EFA on the data of this study

**was determined by examining the Kaiser- Meyer-Olkin (KMO) Measure of Sampling Adequacy and the Bartlett's Test of Sphericity.** **82**

This is in line with the plan laid out in Section 3.8.2 of the previous chapter. Both these tests indicate suitability of performing factor analysis on all the constructs of this study.

**Table 4.** 6 **shows the results of** **120**

**Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and the Bartlett's Test of Sphericity** for **the** variables **of** **73**

this study: three predictor variables, one moderating variable and one criterion variable. The results of EFA are explained in the sub-sections below.

**Table 4.** 6: **KMO and Bartlett's Test for** **3**

OCB, OC, MT, RA and OI OCB, OC & MT RA OI

**Kaiser-Meyer-Olkin Measure of Sampling** .880 .783 .789 **Adequacy Bartlett's Test of Approx. Chi-Square** **26**

8336.742 833.58 1060.42 Sphericity df 946 15 45 Sig. .000 .000 .000 4.7.1 EFA of predictor variables

Exploratory factor analysis is conducted on

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| **all the** predictor **variables** of **this study. The results** presented **in Table** | **367** |

4.7 below show that with Eigen value of more than 1, eleven factors emerge for the predictor variables. The variance explained by these eleven factors (in the order they appear in Table 4.7 below) is as follows: 11.16%, 3.838%, 2.878, 2.509%, 2.048%, 1.834%, 1.557%, 1.437%, 1.236%, 1.112% and 1.065%. In total, the eleven factors explain 69.73% of the total variance extracted. The 12 items measuring Organizational Citizenship Behaviours formed three factors. This factor structure is consistent with many past studies and the theoretical prediction of this study. None of the 12 items was dropped because factor loadings for

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| **all the** items **were above the** threshold **of 0.** 5 **(Hair et al., 1998).** | **178** |

In addition, for Organizational Citizenship Behaviours, the factor labels proposed by Podsakoff and Philip (1990) suited the extracted factors in this study and were thus retained. The 23 items measurig Organizational Culture formed 5 factors. These five factors are

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| **consistent with the** seminal **study of** Tsui **et al.** (2006) who also **found** | **14** |

five factors of Organizational Culture in the Chinese context. Thus the factor labels as proposed by Tsui, Wang, and Xin (2006) suited the extracted factors in this study and were retained. However,

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| **a total of** four **items were eliminated because they did not contribute to a simple factor structure and failed to meet** the **minimum** criterion **of having factor loading of 0.** 5 **or above** | **66** |

(Hair et al., 1998). The four items are: “My organization shows concern for individual development” (OC.EmpDev.1), “My organization Emphasizes team building” (OC.Harmony.1) “For my organization, customer is number 1”( OC.CustOrient.4) and “My organization shows social responsibility” (OC.SocRes.1). These ‘offending’ items were not used for further analysis The 9 items that measured Managerial Ties formed 3 factors. These three factors are consistent with the theoretical prediction of this study and thus the labels of past studies for these factors are retained. However one item, “Ties with managers at competitor firms” (MT.Man.3) was found to have a low factor loading of .460

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| **which is below the threshold of** 0.5 **(Hair et al., 1998).** | **116** |

This ‘offending’ item was thus eliminated and not used in further data analysis. Table 4.7: EFA of predictor variables Items

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| **Factors 1 2 3 4 5 6 7 8 9 10 11** | **150** |

OCB.Alt.1 .836 OCB.Alt.2 .795 OCB.Alt.3 .808 OCB.Alt.4 .806 OCB.Spo.1 .833 OCB.Spo.2 .872 OCB.Spo.3 .873 OCB.Spo.4 .841 OCB.Con.1 .764 OCB.Con.2 .852 OCB.Con.3 .856 OCB.Con.4 .812 MT.Man.1 .822 MT.Man.2 .829 MT.Man.3 .460 MT.Res.1 .784 MT.Res.2 .832 MT.Res.3 .823 MT.Gov.1 .797 MT.Gov.2 .555 MT.Gov.3 .621 OC.EmpDev.1 .355 OC.EmpDev.2 .572 OC.EmpDev.3 .711 OC.EmpDev.4 .738 OC.EmpDev.5 .721 OC.Harmony.1 .437 OC.Harmony.2 .717 OC.Harmony.3 .665 OC.Harmony.4 .703 OC.Harmony.5 .542 OC.CustOrient.1 .693 OC.CustOrient.2 .777 OC.CustOrient.3 .759 OC.CustOrient.4 .357 OC.CustOrient.5 .646 OC.SocRes.1 .490 OC.SocRes.2 .759 OC.SocRes.3 .835 OC.SocRes.4 .701 OC.Innov.1 .665 OC.Innov.2 .793 OC.Innov.3 .838 OC.Innov.4 .725 % of variance 11.165 3.838 2.878

2.509 2.048 1.834 1.557 1.437 1.236 1.112 1.065 Eigen value 8.002 7.673 7.433 6.938 6.412 6.357 6.257 6.174 5.798 4.541 4.141 Total variance extracted by 11 factors = 69.73%. 4.7.2 EFA of Regimes of Appropriability (moderating variable) Regimes of Appropriability is the moderating variable in this study. Exploratory factor analysis is conducted on this moderating variable. The factor loading matrix presented in Table 4.8 below shows that with Eigen value of more than 1, one factor emerges. This single factor explains 54.24% of the variance. However one item, “In your industry, to what extent is being first to market (lead time) effective in protecting product and process innovations?” was found to have low factor loading of 0.294 which was below the threshold of 0.5

**(Hair et al., 1998). This** item **was** thus discarded and **not used in** **206**

further data analysis. Table 4.8: EFA of Regimes of Appropriability Communalities Factor Items Extraction 1 RA1 RA2 RA3 RA4 RA5 RA6 .683 .714 .658 .086 .609 .504 .826 .845 .811 .294 .780 .710 % of variance 54.24 Eigen value 3.254

**Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.** Factor loadings <**.3** are suppressed. **4.** 7 **.3** **135**

Open Innovation Exploratory factor analysis was conducted on the criterion variable of this study, Open Innovation. The factor loading matrix is presented in Table 4.9 which shows that with Eigen value of more than 1, two factors emerge for Open Innovation. The first factor explains 29.35% of the variance while the second factor explains 24.69% of the variance. In total, these two factors explain 57.62% of the variance. These two factors are consistent with the theoretical prediction of this study. In addition, the two factors are also consistent with past studies on Open Innovation which highlight two dimensions of Open Innovation: In-bound Open Innovation and Out-bound Open Innovation. Hence the labels for these two factors from past studies, In-bound and Out-bound, are retained in this study. However,

**a total of** three **items were eliminated because they did not contribute to a** single **factor structure and** **66**

had factor loadings of below 0.5 (Hair et al., 1998). Two of these items were from the In-bound dimension while one was from the Out-bound dimension of Open Innovation. The three items are: “My organization believes it is good to use external sources (e. g., research groups, universities, suppliers, customers, competitors, etc.) to complement our own R&D” [IBOI.3], “My organization often brings in externally developed knowledge and technology to use in conjunction with our own R&D” [IBOI.4] and “In my organization, external technology commercialization is restricted to technologies that are not used internally” [OBOI.2]. These three ‘offending’ items were eliminated and not used in further data analysis. Table 4.9: EFA of Open Innovation IBOI.1 IBOI.2 IBOI.3 IBOI.4 IBOI.5 IBOI.6 OBOI.1 OBOI.2 OBOI.3 OBOI.4 Items Communalities Factors Extraction 1 2 .506 .584 .160 .248 .738 .688 .673 .367 .727 .713 .703 .762 .400 .498 .858 .828 .810 .601 .851 .841 % of variance 29.348 24.691 Eigen value 3.132 2.272

**Total variance extracted by** 2 **factors** = 57.62 % **Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.** **3**

Factor loadings < .3 are suppressed 4.8 EFA post removal of ‘offending’ items Exploratory factor analysis conducted on all the variables of this study confirmed the results of scale purification conducted earlier in Section 4.6 in which nine items were identified as ‘offending’ item. The exploratory factor analysis confirmed that four items from Organizational Culture construct, one item from Managerial Ties construct, three items from Open Innovation construct and one item from Regimes of Appropriability construct had unacceptable

factor loadings. Therefore a decision is made not to use these nine ‘offending’ items in further analysis 5 .

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| **Based on the results of** scale purification and **exploratory factor** analyses above, **the** | **115** |
| **number of items has been reduced in the** | **3** |

Organizational Culture construct, Managerial Ties 5 In addition, one item (OC.EmpDev.1) from Employee Development dimension of Organizational Culture that had borderline item-total-correlation was found to have low factor loading (.355) in exploratory factor analysis. This item is thus dropped from further analysis. construct, Open Innovation construct and Regimes of Appropriability construct. This is expected to affect reliability of the scale and therefore exploratory factor analysis and reliability tests need to be performed again. The

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| **results of the factor analysis** tests **and reliability tests for all** the variables **are** presented **in** | **282** |

the sections below. However, before Exploratory Factor Analysis (EFA) tests are conducted using

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| **Principal Component Analysis as the extraction method and Varimax with Kaiser Normalization as the rotation method,** | **108** |

appropriateness of conducting EFA on the data of this study with reduced number of items is

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| **determined by examining the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and the Bartlett's Test of Sphericity.** | **82** |
| **Table 4.** 10 **shows the results of** | **120** |
| **Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and the Bartlett's Test of Sphericity** for **the** variables **of** | **73** |

this study. The results indicate suitability of conducting an exploratory factor analyses on the data with reduced items.

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| **Table 4.** 10: **KMO and Bartlett’s Test for** | **3** |

OCB, OC and MT. OCB, OC & MT RA OI

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| **Kaiser-Meyer-Olkin Measure of Sampling** 867 .783 .789 **Adequacy Bartlett's Test of Approx. Chi-Square** | **26** |

7365.251 833.58 1060.42 Sphericity df 741 15 45 Sig. .000 .000 .000 4.8.1 EFA of predictor variables Exploratory factor analysis was conducted on the predictor variables of this study after removing the

'offending' items identified in the first EFA. The new factor loading matrix is

**shown in Table 4.11** below. The table **shows that** all **the** **142**

items have acceptable factor loadings. The table further shows that with Eigen value of more than 1 and consistent with the theoritical prediction, eleven factors emerged. The variance explained by these eleven factors (in the order they appear in Table 4.11 below) is as follows: 3.806 %, 2.432%, , 1.807%, 1.348%, 1.052%, 8.855%, 7.217%, 6.792%, 6.665%, 5.957% and 4.439%. In total, the eleven factors explain 73.21% of the total variance extracted. Three factors were obtained for Organizational Citizenship Behaviours, five for Organizational Culture and three for Managerial Ties. It is evident that all the items have acceptable factor loadings. In addition, internal consistency for each scale was examined using Cronbach's alpha; and as the table below shows, some improvements in reliability of the scales were also achieved. Table 4.11: EFA of the predictor variables Items

**Factors 1 2 3 4 5 6 7 8 9 10 11** **150**

Item-total-correlation OCB.Alt.1 .836 .735 OCB.Alt.2 .793 .633 OCB.Alt.3 .809 .688 OCB.Alt.4 .809 .672 OCB.Spo.1 .831 .769 OCB.Spo.2 .878 .844 OCB.Spo.3 .873 .800 OCB.Spo.4 .845 .768 OCB.Con.1 .764 .611 OCB.Con.2 .851 .748 OCB.Con.3 .856 .738 OCB.Con.4 .813 .687 MT.Man.1 .859 .632 MT.Man.2 .856 .632 MT.Res.1 .832 .664 MT.Res.2 .837 .774 MT.Res.3 .798 .744 MT.Gov.1 .805 .598 MT.Gov.2 .642 .704 MT.Gov.3 .694 .697 OC.EmpDev.2 .569 .623 OC.EmpDev.3 .725 .761 OC.EmpDev.4 .753 .710 OC.EmpDev.5 .739 .576 OC.Harmony.2 .766 .684 OC.Harmony.3 .672 .704 OC.Harmony.4 .745 .630 OC.Harmony.5 .474 .621 OC.CustOrient.1 .697 .583 OC.CustOrient.2 .807 .666 OC.CustOrient.3 .771 .618 OC.CustOrient.5 .650 .564 OC.SocRes.2 .777 .546 OC.SocRes.3 .860 .834 OC.SocRes.4 .743 .730 OC.Innov.1 .673 .658 OC.Innov.2 .802 .725 OC.Innov.3 .855 .746 OC.Innov.4 .731 .638 % of variance 3.806 2.432 1.807 1.348 1.052 8.855 7.217 6.792 6.665 5.957 4.439 Eigen value 9.798 3.806 2.651 2.432 1.993 1.807 1.488 1.348 1.146 1.052 1.030 Total variance extracted by 11 factors = 73.21%. Improvement in Cronbach's Alpha No change. No change. No change. .029 No change. No change. .004 .063 .027 .041 No change. 4.8.2 Regimes of Appropriability (moderating variable) Exploratory factor analysis was conducted after removing the one 'offending' item of Regimes of Appropriability identified in the first EFA. Table 4.12 below shows the new factor loading matrix. It can be seen that all the items have acceptable factor loadings. With Eigen value of more than 1, one factor emerged explaining 63.86% variance. As a result of deleting the 'offending' item, an improvement in internal consistency was also noticed with Cronbach's Alpha improving by .044. Table 4.12: EFA of Regimes of Appropriability Items RA1 RA2 RA3 RA5 RA6 Communalities Factor Extraction 1 .683 .727 .653 .617 .512 .827 .853 .808 .786 .716 % of variance 63.86 Eigen value 3.193

**Total variance extracted by 1 factor** = 63.86 % **Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.** **3**

Factor loadings < .3 are suppressed. Item-total-correlation .704 .747 .690 .652 .578 Improvement in Cronbach's Alpha .044 4.8.3 Open Innovation Exploratory factor analysis was conducted after removing the three 'offending' items of Open Innovation identified in the first EFA. Table 4.13 below shows the new factor loading matrix. It can be seen that all the items have acceptable factor loadings. With Eigen value of more than 1, two factors emerged explaining total of 69.42% variance. The first factor explained 37.60% variance while the second factor explained 31.82% variance. As a result of deleting the three 'offending' items, an improvement in internal consistency, measured using Cronbach's Alpha was also noticed. Table 4.13: EFA of Open Innovation Items IBOI.1 IBOI.2 IBOI.5 IBOI.6 OBOI.1 OBOI.3 OBOI.4 Communalities Factors Item-total- Extraction 1 2 correlation .520 .619 .770 .726 .726 .747 .753 .714 .784 .876 .851 .846 .863 .865 % of variance 37.60 31.82 Eigen value 2.874 1.985

**Total variance extracted by** 2 **factors** = 69.42 % **Extraction Method:** **3**

**Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.**

Factor loadings < .3 are suppressed. .543 .621 .746 .705 .667 .686 .694 Improvement in Cronbach's Alpha .086 .036

**In summary, after** purifying **the scales, all the items** **3**

measuring all constructs have acceptable loadings of more than .5 and

**Cronbach's Alpha** for **all** the **scales** is **above the threshold** **92**

of .70. The factors extracted were

**in line with the theoretical** predictions. The **results of the** factor analyses **and** **347**

reliability statistics suggest unidimensionality of the constructs, which consequently can be used in further analyses (Lu, Lai, & Cheng, 2007). 4.9 Scale reliability sans 'offending' items As mentioned above, nine items were discarded in total from all the constructs leading to changes in the item-total-correlation and reliability of the scales. Table 4.14 below presents the item-total-correlation of all the items and the final Cronbach's Alphas for all the scales. As is evident, item-total-correlation for all the items are greater than 0.5 while

**Cronbach's Alphas for all** the **scales** are well above **the** threshold **of 0.** **339**

7, indicating reliability of all the scales as suggested by (Hair et al., 1998). Table 4.14: Reliability statistics OCB.Alt.1 OCB.Alt.2 OCB.Alt.3 OCB.Alt.4 OCB.Spo.1 OCB.Spo.2 OCB.Spo.3 OCB.Spo.4 OCB.Con.1 OCB.Con.2 OCB.Con.3 OCB.Con.4

**Items Mean SD Item-Total-** Correlation **Cronbach's Alpha** **3**

OC.EmpDev.2 OC.EmpDev.3 OC.EmpDev.4 OC.EmpDev.5 OC.Harmony.2 OC.Harmony.3 OC.Harmony.4 OC.Harmony.5 OC.CustOrient.1 OC.CustOrient.2 OC.CustOrient.3 OC.CustOrient.5 OC.SocRes.2 OC.SocRes.3 OC.SocRes.4 OC.Innov.1 OC.Innov.2 OC.Innov.3 OC.Innov.4 MT.Man.1 MT.Man.2 5.48 5.33 5.51 5.34 4.48 4.39 4.18 4.51 5.37 5.30 5.37 5.36 4.35 4.28 4.20 4.31 4.35 4.31 4.33 4.33 4.22 4.19 4.22 4.23 4.03 4.24 4.25 4.29 4.24 4.35 4.20 4.94 5.01 .895 .826 .949 .891 1.575 1.639 1.741 1.636 .899 .877 .899 .867 .715 .759 .814 .735 .728 .773 .712 .751 .678 .654 .661 .657 .770 .871 .832 .730 .830 .780 .879 1.423 1.458 .735 .633 .688 .672 .769 .844 .800 .768 .611 .748 .738 .687 .620 .752 .708 .585 .684 .704 .630 .621 .583 .666 .618 .564 .546 .834 .730 .658 .725 .746 .638 .632 .632 .845 .909 .854 .834 .831 .796 .835 .849 .774 Table 4.14: Reliability statistics (continued) MT

**.Res.1** MT **.Res.2 MT.Res.3** **251**

MT.Gov.1 MT.Gov.2 MT.Gov.3 IBOI.1 IBOI.2 IBOI.5 IBOI.6 OBOI.1 OBOI.3 OBOI.4 RA1 RA2 RA3 RA5 RA6

**Items Mean SD Item-Total-** Correlation **Cronbach's Alpha** **3**

4.73 4.88 4.85 4.88 4.80 5.07 4.39 4.31 4.19 4.17 4.35 4.10 4.05 4.27 4.12 4.17 4.27 4.13 1.426 1.373 1.402 1.332 1.394 1.392 .672 .755 .774 .781 .768 .920 .935 .891 .968 .943 .851 .874 .664 .774 .744 .598 .704 .697 .543 .621 .746 .705 .667 .686 .694 .704 .747 .690 .652 .578 .854 .814 .826 .822 .858 4.10 Confirmatory Factor Analysis As planned in section 3.7.2.2 of the previous chapter, confirmatory factor analysis is conducted with the aim to evaluate and validate the measurement model used in this study (Byrne, 2001, p. 164). Measurement model is the link between factors and their measured variables and thus

> **defines relations between** the **observed and the unobserved variables** **218**

(Byrne, 2001, pp. 6, 12). There are two ways of evaluating validity of the measurement model: one, testing each construct separately, that is having only one construct in the measurement model; two, testing all the constructs together at a time in one measurement model (Cheng, 2001). While researchers (e.g. Woo, Trail, Kwon, & Anderson, 2009) have preferred testing all constructs at once to testing each construct separately as the former allows taking into account the relationships between the items of different constructs - in this study, the researcher takes a more rigorous approach by choosing both the methods. In the EFA, the factor structure is explored while

> **in the CFA the factor structure extracted in the EFA** **11**

is confirmed. Thus, guided by the results of the exploratory factor analysis (EFA), in Approach I, one measurement model each was specified for all the constructs of the study: that is, three predictor

> **variables, one** moderating **variable and one** criterion **variable. In** Approach II, all **the** **400**

constructs are assessed in a single measurement model. As mentioned in section 3.8.2 in the previous chapter and consistent with Hair et al. (2010, p. 644) who suggested using at least three to four fit indices to evaluate model fit, this study used

> **χ 2** values **and degrees of freedom, the CFI and the RMSEA** **3**

to evaluate the measurement models. Only these indices are used because Hair et al. (2010, p. 644) suggest against reporting all the goodness-of-fit indices in view of redundancy and recommend reporting at least

> **one incremental index** and **one absolute index** in addition to **Chi-square** statistic (χ2) **and associated degrees of freedom.** **114**

Approach I: Assessing Individual

> **Measurement Models The** summary details **of the** five **measurement models** for **the** **379**

five constructs and their corresponding model fit indices are shown below in Table 4.15. For complete visual representations of all the five measurement models and additional statistical outputs, please refer to Appendix C.

**As can be seen in the** table, the **initial model** 115

fits for all the constructs except Organizational Citizenship Behaviours were not reasonable. The table shows the initial model fits for all constructs (taking into consideration all the items representing those constructs). Therefore based on the modification index provided by AMOS ™ , certain model modifications with respect to all the constructs with poor fit were made. The items in the table below with asterisks against them were dropped from the final model due to unacceptable factor loadings. The last column in Table 4.15 shows the final model fits for all the constructs after the 'offending' items were dropped. The initial model fit index for Organizational Culture showed unreasonable fit: CMIN/DF = 2.910; CFI = .888; RMSEA = .075. Therefore the model was modified and four items namely OC.EmpDev.1, OC.Harmony.1, OC.CustOrient.4 and OC.SocRes.1 were dropped. From the dimension Employee development, one item OC.EmpDev.1 (My organization provides training in knowledge and skills) was dropped because the concept of this item was covered in the item OC.EmpDev.2 (My organization shows concern for individual development) and OC.EmpDev.5 (My organization develops employees' potentials). The concept of an item dropped from the dimension Harmony, OC.Harmony.1 (My organization emphasizes team building), was covered in OC.Harmony.2 (My organization supports cooperative spirit) and OC.Harmony.3 (My organization promotes feeling/sharing among employees). Another item dropped was from the dimension Customer Orientation, OC.CustOrient.4 (For my organization, customer is number 1). This item was conceptually covered in item OC.CustOrient.1 (My organization satisfies need of customers on largest scale) and item OC.CustOrient.2 (My organization strongly emphasizes profit of customer. The fourth item dropped from Organizational Culture construct was OC.SocRes.1 (My organization shows social responsibility) from Social Responsibility dimension. Conceptually, this item was also adequately covered by item OC.SocRes.2 (My organization's mission is to serve society). After removing these items from the measurement model for Organizational Culture, the new model fitted the data better: CMIN/DF = 2.571; CFI = .931; RMSEA =.068. In addition, the initial model fit index for Managerial Ties showed unreasonable fit: CMIN/DF = 8.568, CFI = .879, RMSEA =.150. Therefore this measurement model was also modified and one item namely MT.Manager.1 was dropped. This item was dropped from the Ties with Managers dimension. This item, MT.Manager.1 (Ties with managers at supplier firms) could be partially considered to be covered by the item MT.Manager.2 (Ties with managers at buyer firms) and item MT.Manager.3 (Ties with managers at competitor firms). After removing this item from the measurement model for Managerial Ties, the new model fitted the data better: CMIN/DF = 3.678; CFI = .967; RMSEA =.089. Further, the initial model fit index for the moderating variable, Regimes of Appropriability showed unreasonable fit: CMIN/DF = 12.970; CFI = .870; RMSEA =.188. Therefore this measurement model too was modified and one item namely RA.4 (In your industry, to what extent is being first to market (lead time) effective in protecting product and process innovations?) was dropped. After removing this item from the measurement model for Regimes of Appropriability, the new model fitted the data much better: CMIN/DF = 1.449; CFI = .999; RMSEA =.036. Lastly, the initial model fit index for the criterion variable of this study, Open Innovation showed quite reasonable fit: CMIN/DF = 1.262; CFI = .991; RMSEA =.028. However, three (3) items from this construct were dropped as retaining these 3 items caused convergent and discriminant validity issues (as explained later in sub-section 4.10.1). These 3 items are: IBOI.3 (My organization believes it is good to use external sources [e. g., research groups, universities, suppliers, customers, competitors, etc.] to complement our own R&D); IBOI.4 (My organization often brings in externally developed knowledge and technology to use in conjunction with our own R&D); and OBOI.2 (In my organization,

**external technology commercialization is restricted to technologies that are not used internally).** 81

After removing these 3 items, the measurement model fit was still acceptable: CMIN/DF = 1.550; CFI = .992; RMSEA =.040. Table 4.15: Model fit indices Construct Dimension Items Initial Model Fit Final Model Fit Organizational Culture Organizational Citizenship Behaviours

**Employee Development Harmony Customer Orientation Social Responsibility Innovation** 2

Altruism Sportsmanship Contentiousness OC.EmpDev.1* OC.EmpDev.2 OC.EmpDev.3 OC.EmpDev.4 OC.EmpDev.5 OC.Harmony.1* OC.Harmony.2 OC.Harmony.3 OC.Harmony.4 OC.Harmony.5 OC.CustOrient.1 OC.CustOrient.2 OC.CustOrient.3 OC.CustOrient.4* OC.CustOrient.5 OC.SocRes.1* OC.SocRes.2 OC.SocRes.3 OC.SocRes.4 OC.Innov.1 OC.Innov.2 OC.Innov.3 OC.Innov.4 OCB.Altruism.1 OCB.Altruism.2 OCB.Altruism.3 OCB.Altruism.4 OCB.Sports.1 OCB.Sports.2 OCB.Sports.3 OCB.Sports.4 OCB.Consent.1 OCB. Consent.2 OCB. Consent.3 OCB. Consent.4 CMIN/DF = 2.910 CFI = .888 RMSEA = .075 CMIN/DF = 1.878 CFI = .979 RMSEA =.051 CMIN/DF = 2.571 CFI = .931 RMSEA =.068 Unchanged Table 4.15: Model fit indices (continued) Construct Dimension Items Initial Model Fit Final Model Fit Managerial Ties Regimes of Appropriability Open Innovation Ties with Managers Ties with Researchers Ties with Govt. Officials Regimes of Appropriability In-bound Open Innovation Out-bound Open Innovation MT.Manager.1* MT.Manager.2 MT.Manager.3 MT.Researcher.1 MT.Researcher.2 MT.Researcher.3 MT.Govt.1 MT.Govt.2 MT.Govt.3

**RA.1 RA.2 RA.3 RA.4* RA.5** RA.6 IBOI **.1** IBOI **.2** IBOI **.3*** IBOI **.4*** **253**

IBOI.5 IBOI.6 OBOI.1 OBOI.2* OBOI.3 OBOI.4 *Indicates the items deleted from the final model CMIN/DF = 8.568 CFI = .879 RMSEA =.150 CMIN/DF = 12.970 CFI = .870 RMSEA =.188 CMIN/DF = 1.262 CFI = .991 RMSEA =.028 CMIN/DF = 3.678 CFI = .967 RMSEA =.089 CMIN/DF = 1.449 CFI = .999 RMSEA =.036 CMIN/DF = 1.550 CFI = .992 RMSEA =.040 Approach II: Assessing the Measurement Model with all Variables As mentioned before some researchers such as Woo et al. (2009) have suggested testing all constructs at once as this approach allows taking into account the relationships between the items of different constructs. Consequently, all the five constructs of this study including three predictor variables, one moderating variable, and one criterion variable were evaluated in one measurement model. The summary details of this measurement models for all the five constructs put together and the model

**fit indices are shown** below **in Table** 4.16. **In** addition, **the** **432**

visual representations of the initial and the final measurement models are also given below. Figure 4.1: Showing the initial measurement model with all items χ 2 /df CFI RMSEA 1.882 .867 .051 Figure 4.2: Showing the final measurement model with 'offending' items dropped χ 2 /df CFI RMSEA 1.774 .909 .048

**As can be seen in Table 4.** 16 below, **the** initial model fit **for the** measurement **model** **91**

was not reasonable: CMIN/DF = 1.882; CFI = .867; RMSEA = .05. Therefore, the 'offending' items identified in the individual assessment of the measurement models (which, quite logically, were the same as those identified in Scale Purification in Section 4.6 and EFA in Section 4.7) were eliminated and the measurement model was re-assessed. This final measurement model, as per Hair et al. (2010) fitted the data acceptably: CMIN/DF = 1.764; CFI = .909; RMSEA = .048 Table 4.16: Initial and final model fit of the measurement model Construct Items Initial Model Fit Final Model Fit All Constructs All Items CMIN/DF = 1.882 CFI = .867 RMSEA = .051 CMIN/DF = 1.764 CFI = .909 RMSEA = .048 4.10.1 Construct Validity According to Hair et al. (2010, p. 124),

**validity is the extent to which measures of a construct** **303**

accurately represent the construct. After the researcher ensures that the scale conforms to its conceptual definition, is uni-dimensional and has appropriate levels of reliability, validity is the last assessment that needs to be made.

**Two of the most widely accepted forms of validity are** discriminant **and** convergent **validity.** **279**

Byrne (2001, p. 275) states that for proper inferences to be drawn based on the data, the data needs to exhibit evidence of discriminant and convergent validity. Although Schumacker and Lomax (2004) state that validating the measurement model is enough to address any issue of

**convergent validity and discriminant validity, in this study** 445

these aspects of construct validity are further analyzed as follows. 4.10.1.1 Discriminant Validity Hair et al. (2010, p. 124) define discriminant validity as the “degree to which two conceptually similar concepts are distinct” while, based on the work of Campbell and Fiske (1959), Byrne (2001, p. 275) states that discriminant validity is the “extent to which independent assessment methods diverge in their measurement of different trials”. In simple words, in the presence of discriminant validity issues, the variables of a study

**correlate more highly with variables outside their parent factor than with the variables within their parent factor,** 11

as a result of which, the latent factors are better explained by some other variables than by its own observed variables 6 . Discriminant validity can be assessed with the help of AMOS ™ and a Microsoft ® Excel ™ Macro. To assess discriminant validity,

**Maximum Shared Squared Variance (MSV), Average Shared Squared Variance (ASV)** 11

and Average Variance Extracted (AVE) are calculated. According to Hair et al. (2010), for discriminant validity to be present: 1. Maximum Shared Squared Variance (MSV) should be less than Average Variance Extracted (AVE), that is MSV < AVE, and 2. Average Shared Squared Variance (ASV) should also be less than Average Variance Extracted (AVE), that is ASV < AVE. In this study, a macro developed by kolobkreations.com was used to calculate MSV, ASV and AVE. This Microsoft ® Excel ™ macro calculates these statistics based on standardized regression weights and correlation tables of the measurement model as obtained in AMOS ™ . The macro can be had from: http://statwiki.kolobkreations.com/. The results obtained after using this macro are displayed below in Table 4.17. 6 Pre-digested explanation from kolobkreations.com Table 4.17: Discriminant validity test Dimensions AVE MSV ASV 1. Employee Development 0.572 0.524 0.229 2. Harmony 0.554 0.540 0.264 3. Customer Orientation 0.499 0.389 0.180

**4. Social** Responsibility **0.** 665 **0.** 329 **0.** 162 **5.** Innovation **0.** 596 **0.** 520 **0.** 327

195 6. Ties with Managers 0.595 0.457 0.176 7. Ties with Researchers 0.668 0.468 0.179 8. Ties with Govt. Officials 0.597 0.468 0.222 9. Sportsmanship 0.717 0.244 0.119 10. Conscientiousness 0.600 0.125 0.023 11. Altruism 0.579 0.125 0.025 12. Regimes of Appropriability 0.551 0.483 0.259 13. In-bound Open Innovation 0.560 0.540 0.302 14. Out-bound Open Innovation 0.612 0.129 0.050 AVE:

**Average Variance Extracted** MSV: **Maximum Shared Squared Variance** ASV: **Average Shared Squared Variance** 11

As can be seen in Table 4.17 above,

**Maximum Shared Squared Variance (MSV) and Average Shared Squared Variance (ASV)** for all **the** 11

dimensions of the constructs of this study is less than Average Variance Extracted (AVE). Hence this

provides enough evidence that all the 14 dimensions (forming 5 constructs) used in this study are distinct and thus discriminant validity is established. 4.10.1.2 Convergent

**Validity Convergent validity assesses the**"degree to which two measures of the same concept are correlated" **(Hair et al.,** 459

2010, p. 124). It is also interpreted as the

**extent to which different assessment methods concur in their measurement of the same** 266

traits (Byrne, 2001, p. 275). In simple words, in the absence of convergent validity,

**variables do not correlate well with each other within their parent factor,** and hence **the latent factor is not well explained by its observed variables** 11

7 . Convergent validity of the constructs of this study can be assessed with the help of AMOS ™ and Microsoft ® Excel ™ macro that was used to assess discriminant validity as well. To assess

**convergent validity, Composite Reliability (CR) and Average Variance Extracted (AVE)** are **calculated.** 288

According to

**Hair et al. (2010),** for **convergent validity** 475

to be present: 1. Composite Reliability (CR) should be greater than Average Variance Extracted (AVE), that is CR > AVE, and 2. Average Variance Extracted

**(AVE) should be greater than 0.** 5, that is **AVE**> 0.5. **In this** 368

study, as mentioned above, the macro developed by kolobkreations.com was used to calculate CR and AVE. This Microsoft ® Excel ™ macro calculates these statistics based on standardized regression weights and correlation tables of the measurement model as obtained in AMOS ™ . The results obtained after using this macro are displayed below in Table 4.18. 7 Pre-digested explanation from kolobkreations.com Table 4.18: Convergent validity test Dimensions CR AVE 1. Employee Development 0.840 0.572 2. Harmony 0.832 0.554 3. Customer Orientation 0.799 0.499 4. Social Responsibility 0.851 0.665 5. Innovation 0.855 0.596 6. Ties with Managers 0.729 0.595 7. Ties with Researchers 0.857 0.668 8. Ties with Govt. Officials 0.814 0.597 9. Sportsmanship 0.910 0.717 10. Conscientiousness 0.855 0.600 11. Altruism 0.846 0.579 12. Regimes of Appropriability 0.859 0.551 13. In-bound Open Innovation 0.835 0.560 14. Out-bound Open Innovation 0.826 0.612 CR: AVE: Composite Reliability Average Variance Extracted

**As can be seen in Table 4.** 18 above, **the** Composite Reliability (CR) **for** all **the** 91

dimensions of the constructs of this study is greater than Average Variance Extracted (AVE). Besides, the AVE for all the dimensions, except Customer Orientation, is greater than 0.5. In the case of Customer

Orientation, AVE is 0.499 which is a borderline case and can be considered acceptable. Hence there is enough evidence that all the 14 dimensions (forming 5 constructs) used in this study exhibit convergent validity. In addition to this, the Composite Reliability (CR) of all the dimensions in the measurement model is greater than 0.7 while

> **factor loadings** of **all** the **items** are **above the cutoff** point **of 0.** **330**

5. This provides enough evidence of unidimensionality of the constructs of interest and

> **reliability of the measures used in this study** **396**

(Hair et al., 2010). In summary, CFA results in combination with construct validity tests

> **provide a better understanding of the** quality **of the** **219**

measures being used (Hair et al., 2010). In this study CFA assessed

> **the measurement model by examining the unidimensionality, reliability and validity** **3**

of the constructs including convergent validity (correspondence or convergence between similar constructs) and discriminant validity (discrimination between dissimilar constructs) (Garver & Mentzer, 1999). The results of the CFA offered evidence for discriminant and convergent validity of the latent variables and also indicated

> **that the measurement model** of this study **fits the data** quite **well and the** **325**

findings of this study can thus be considered valid and generalizable. Table 4.19 below summarizes the statistics

> **with regard to** validity, **reliability and** uni-dimensionality **of the constructs** of **this** **364**

study. Table 4.19: Discriminant validity, convergent validity and reliability of measures Construct Dimensions Items Organizational Culture Organizational Citizenship Behaviours Managerial Ties

> **Employee Development Harmony Customer Orientation Social Responsibility Innovation** **2**

Altruism Sportsmanship Contentiousness Ties with Managers Ties with Researchers OC.EmpDev.2 OC.EmpDev.3 OC.EmpDev.4 OC.EmpDev.5 OC.Harmony.2 OC.Harmony.3 OC.Harmony.4 OC.Harmony.5 OC.CustOrient.1 OC.CustOrient.2 OC.CustOrient.3 OC.CustOrient.5 OC.SocRes.2 OC.SocRes.3 OC.SocRes.4 OC.Innov.1 OC.Innov.2 OC.Innov.3 OC.Innov.4 OCB.Altruism.1 OCB.Altruism.2 OCB.Altruism.3 OCB.Altruism.4 OCB.Sports.1 OCB.Sports.2 OCB.Sports.3 OCB.Sports.4 OCB.Consent.1 OCB. Consent.2 OCB. Consent.3 OCB. Consent.4 MT.Manager.2 MT.Manager.3 MT.Researcher.1 MT.Researcher.2 MT.Researcher.3 Factor Loading .72 .87 .80 .61 .75 .78 .70 .74 .68 .76 .68 .70 .58 .93 .89 .74 .82 .80 .71 .82 .70 .78 .74 .82 .91 .85 .80 .63 .86 .85 .73 .52 .92 .70 .87 .87 CR AVE ASV MSV Sqr

AVE .840 .572 .229 .524 .756 .832 .554 .264 .540 .744 .799 .50 .180 .389 .706 .851 .665 .162 .329 .815 .855 .596 .195 .520 .772 .846 .579 .025 .125 .761 .910 .717 .119 .244 .847 .855 .600 .023 .125 .774 .729 .597 .176 .457 .771 .857 .668 .179 .468 .817 Table 4.19: Discriminant validity, convergent validity and reliability of measures (continued) Construct Dimensions Items Factor Loading CR AVE ASV MSV Sqr AVE Ties with Govt. Officials MT.Govt.1 MT.Govt.2 MT.Govt.3 .63 .85 .82 .814 .597 .222 .468 .773 Regimes of Appropriability Open Innovation Regimes of Appropriability In-bound Open Innovation Out-bound Open Innovation

**RA.1 RA.2 RA.3 RA.5 RA.6** 307

IBOI.1 IBOI.2 IBOI.5 IBOI.6 OBOI.1 OBOI.3 OBOI.4 CR:

**Composite Reliability** AVE: **Average Variance Extracted** ASV: Average **Shared Squared Variance MSV:** Maximum **Shared Squared Variance** 11

Sqr AVE: Square root of Average Variance Extracted .81 .80 .72 .62 .75 .66 .71 .82 .79 .76 .80 .79 .859 .551 .259 .483 .742 .835 .560 .302 .540 .748 .826 .612 .050 .129 .783 4.11 Cluster Analysis Following the procedure used by Tsui et al. (2006), and to make further sense of Organizational Culture of high-tech firms in Malaysia, cluster analysis

**was performed on the five** dimensions of **Organizational Culture** obtained in **the** 2

EFA and confirmed in the CFA. This enabled the researchers to extract easier-to-understand conclusions about the data. Denison and Mishra (1995) state that an

**important approach to study Organizational Culture is** to identify **Organizational Culture types that involve different combinations of a set of culture** 2

dimensions. Therefore, cluster analysis was performed

**using the K-means procedure on the five** dimensions of **Organizational Culture.** 2

**Results of three-cluster, four- cluster and five cluster** 2

solutions were compared and examined. Although a

**four-cluster solution was the most**"interpretable" in **the** study **of** 2

Tsui et al (2006), in the current study a three-cluster solution was found to be most interpretable. This three-cluster solution was also very close to the past studies including the one by Tsui et al (2006). The first cluster had high value on all the five dimensions of

**Organizational Culture (i.e.** both **internal integration and external adaptation).** 372

This cluster, in line with past studies, was named Highly Integrative Culture to describe firms' high focus

**on both internal integration and external adaptation. The** 2

second cluster, with good score on all dimensions (but less than it was in case of

**Highly Integrative Culture)** was named **Moderately Integrative Culture. The** 63

third culture, with low score on all the five dimensions of Organizational Culture was named Hierarchy Culture, again deriving the phrase from past studies.

**As can be seen in Table 4.** 20 **below, the** 341

three culture types classify the surveyed firms in this study into three categories: those with Highly Integrative Culture (169 firms; 49.85%), Moderately Integrative Culture (121 firms; 35.70%) and Hierarchy Culture (49 firms; 14.45%). The three culture types obtained as a result of cluster analysis were turned into dummy variables 8 to be used later during hypothesis testing. This was done because the three clusters obtained were not continuously measured variables and thus could not be directly entered into the hierarchical multiple regression models. Table 4.20 below shows the descriptive statistics related to the cluster analysis. For complete SPSS ® output of the cluster analysis, please refer to Appendix C. 8 Dummy variable coding is a means of transforming non-metric data into metric data. It involves the creation of dummy variables, in which 1s and 0s are assigned to subjects, depending on whether they possess a characteristic in question (Hair et al., 2010, p. 14). Table 4.20:

**Organizational Culture** dimensions **under Organizational Culture types Highly Integrative** 2

**Culture Moderately integrative culture Hierarchy Culture F-test** 2
Organizational Culture dimensions **Mean SD N Mean SD N Mean SD N**

Employee development 4.72 .37 169 3.94 .43 121 3.68 .59 49 168.39* Harmony 4.75 .34 169 4.03 .43 121 3.63 .60 49 196.96* Customer orientation 4.47 .36 169 4.06 .50 121 3.70 .54 49 70.02* Social responsibility 4.55 .46 169 4.18 .41 121 2.90 .56 49 220.64* Innovation 4.75 .35 169 3.89 .56 121 3.58 .51 49 209.85* Total firms 169 49.85 121 35.7 49 14.45 339 Note: *P<0.01 4.12 Hypothesis Testing This study is undertaken with the purpose to study the effects of Organizational Citizenship Behaviours, Organizational Culture, and Managerial Ties on In-bound and Out-bound dimensions of Open Innovation.

**The purpose of this** study **is** also **to investigate the moderating** role **of** Regimes of Appropriability **on the relationships between** 247

the above predictor variables and criterion variables. These hypothesized relationships were encapsulated in the 22 hypotheses developed for this study. These hypotheses are now ready to be tested statistically.

**To test the hypotheses** of this study, **hierarchical multiple regression** is employed **to** test **the** 365

direct relations between the predictor variables and the criterion variables as well as the moderating effects. Since this study has two criterion variables, In-bound Open Innovation and Out-bound Open Innovation, hierarchical multiple regression was run twice for each criterion variable. In addition, two control variables namely industry type and firm ownership were also introduced in Step 1 of both the hierarchical multiple regressions models. Although investigating the controlling role of industry type and firm ownership was not a part of the objectives of this study, this was done because if such a controlling role is established, it would be an interesting research finding. However Table 4.21 below shows neither of these two control variables had any significant effect.

**Table 4.** 21 **summarizes the results of the two** 392

hierarchical multiple regressions. Support for each hypothesis or the lack of it is discussed below. For complete SPSS ® output of the two hierarchical multiple regressions, please see Appendix C. 4.12.1 Testing Direct Effects of Predictor Variables Hypothesis 1: the relationship between Altruism and Open Innovation

**Hypothesis 1a: There is a positive relationship between** Altruism **and** 366

In-bound Open Innovation in that Altruism facilitates In-bound Open Innovation.

**The results of the hierarchical** multiple **regression in Table** 4.21 **with** 50

regard to the relationship

**between the predictor variable,** Altruism **and the criterion variable, In-** 65

bound Open Innovation show that the unstandardized regression coefficient is .052, t is 2.26 and these results are statistically significant at p < .05 level. Hence Hypothesis 1a is supported. In other words, the results indicate that higher level of Altruism among the employees of a firm facilitates In-bound Open Innovation.

**Hypothesis 1b: There is a positive relationship between** Altruism **and** 26

Out-bound Open Innovation in that Altruism facilitates Out-bound Open Innovation.

**The results of the hierarchical** multiple **regression in Table** 4.21 below 50
**with**

regard to the

**relationship between the predictor variable,** Altruism **and the** criterion 54
**variable,**

Out-bound Open Innovation show that the unstandardized regression coefficient is .169, t is 4.32 and these results are statistically significant at p < .01 level. Hence Hypothesis 1b is supported. In other words, the results indicate that higher level of Altruism among the employees of a firm facilitates Out-bound Open Innovation. Hypothesis 2: the relationship between Conscientiousness and Open Innovation Hypothesis 2a:

**There is a positive relationship between** Conscientiousness **and** In-bound 8

Open **Innovation**

in that Conscientiousness facilitates In-bound Open Innovation. The

**results of the hierarchical** multiple **regression in Table 4.** 12

21 below with regard to the relationship

**between the predictor variable,** Conscientiousness **and the criterion variable, In-** 65

bound Open Innovation show that the unstandardized regression coefficient is .050, t is 2.18 and these results are statistically significant at p < .05 level. Hence Hypothesis 2a is supported. In other words, the results indicate that higher level of Conscientiousness among the employees of a firm facilitates In-bound Open Innovation. Hypothesis 2b:

**There is a positive relationship between** Conscientiousness **and** Out-bound Open **Innovation** 8

in that Conscientiousness facilitates Out-bound Open Innovation. The

**results of the hierarchical** multiple **regression in Table 4.** 12

21 below with regard to the

**relationship between the predictor variable,** Conscientiousness **and the** criterion **variable,** 54

Out-bound Open Innovation show that the unstandardized regression coefficient is .138, t is 3.57 and these results are statistically significant at p < .01 level. Hence Hypothesis 2b is supported. In other words, the results indicate that higher level of Conscientiousness among the employees of a firm facilitates Out-bound Open Innovation. Hypothesis 3: the relationship between Sportsmanship and Open Innovation

**Hypothesis 3a: There is a positive relationship between** Sportsmanship **and** 26

In-bound Open Innovation in that Sportsmanship facilitates In-bound Open Innovation.

**The results of the hierarchical** multiple **regression in Table 4.** 12

21 below with regard to the relationship

**between the predictor variable,** Sportsmanship **and the criterion variable, In-** 65

bound Open Innovation show that the unstandardized regression coefficient is .066, t is 2.70 and these

results are statistically significant at p < .01 level. Hence Hypothesis 3a is supported. In other words, the results indicate that higher level of Sportsmanship among the employees of a firm facilitates In-bound Open Innovation.

**Hypothesis 3b: There is a positive relationship between** Sportsmanship **and** 26

Out-bound Open Innovation in that Sportsmanship facilitates Out-bound Open Innovation.

**The results of the hierarchical** multiple **regression in Table 4.** 12

21 below with regard to the

**relationship between the predictor variable,** Sportsmanship **and the** criterion **variable,** 54

Out- bound Open Innovation, show that the unstandardized regression coefficient is .188, t is 4.56 and these results are statistically significant at p < .01 level. Hence Hypothesis 3b is supported. In other words, the results indicate that higher level of Sportsmanship among the employees of a firm facilitates Out-bound Open Innovation. Hypothesis 4: the relationship between Ties with Government Officials and Open Innovation Hypothesis 4a: Innovation. Managerial Ties with Government Officials facilitate In-bound Open The

**results of the hierarchical** multiple **regression in Table 4.** 12

21 below with regard to the relationship between the predictor variable, Ties with Government Officials and the criterion variable, In-bound Open Innovation, show that the unstandardized regression coefficient is .090, t is 3.09 and these results are statistically significant at p < .01 level. Hence Hypothesis 4a is supported. In other words, the results indicate that more Ties between managers of a firm and government officials facilitates In-bound Open Innovation. Hypothesis 4b: Managerial Ties with Government Officials facilitate Out-bound Open Innovation.

**The results of the hierarchical** multiple **regression in Table 4.** 12

21 below with regard to the relationship between the predictor variable, Ties with Government Officials and the criterion variable, Out-bound Open Innovation, show that the unstandardized regression coefficient is -.026, t is -.52 and these results are not statistically significant at p < .05 level. Hence Hypothesis 4b is not supported. In other words, the results indicate that

**there is no statistically significant relationship between** Ties **of** managers **of a** 28

firm with government officials and Out-bound Open Innovation. Hypothesis 5: the relationship between

**Managerial Ties with managers at other firms** 9

and Open Innovation Hypothesis 5a:

**Managerial Ties with Managers at other firms** 9

facilitate In-bound Open Innovation.

| | |
|---|---|
| **The results of the hierarchical** multiple **regression in Table 4.** | 12 |

21 below with regard to the relationship between the predictor variable,

| | |
|---|---|
| **Ties with Managers at other firms** and **the** criterion variable, **In-** | 38 |

bound Open Innovation, show that the unstandardized regression coefficient is -.012, t is -.490 and these results are not statistically significant at p < .05 level. Hence Hypothesis 5a is not supported. In other words, the results indicate that more Ties between managers of a firm with managers of other firms do not facilitate In-bound Open Innovation. Hypothesis 5b: Managerial Ties with Managers at other firms facilitate Out-bound Open Innovation. The

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|---|---|
| **results of the hierarchical** multiple **regression in Table 4.** | 12 |

21 below with regard to the relationship between the predictor variable, Ties with Managers at other firms and the criterion variable, Out-bound Open Innovation, show that the unstandardized regression coefficient is .040, t is -1.35 and these results are not statistically significant at p < .05 level. Hence Hypothesis 5b is not supported. In other words, the results indicate that more Ties between managers of a firm with managers of other firms do not facilitate Out-bound Open Innovation. Hypothesis 6: the relationship between Managerial

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|---|---|
| **Ties with universities and/** or **other research centers** | 24 |

and Open Innovation Hypothesis 6a: Managerial

| | |
|---|---|
| **Ties with Universities and/** or **other Research Centers** | 24 |

facilitate In-bound Open Innovation. The

| | |
|---|---|
| **results of the hierarchical** multiple **regression in Table 4.** | 12 |

21 below

| | |
|---|---|
| **with regard to the relationship between** the predictor variable, **Managerial** Ties with Universities **and/** | 170 |

or other Research Centers and the criterion variable, In-bound Open Innovation, show that the unstandardized regression coefficient is .117, t is 4.23 and these results are statistically significant at p < .01 level. Hence Hypothesis 6a is supported. In other words, the results indicate that more Managerial

| | |
|---|---|
| **Ties with Universities and/** or **other Research Centers** | 24 |

facilitate In-bound Open Innovation. Hypothesis 6b: Managerial

| | |
|---|---|
| **Ties with Universities and/** or **other Research Centers** | 24 |

facilitate Out-bound Open Innovation.

> **The results of the hierarchical** multiple **regression in Table** 4.21 below **with** **50**

regard to the relationship between the predictor variable, Managerial Ties with Universities and/or other Research Centers and the criterion variable, Out-bound Open Innovation, show that the unstandardized regression coefficient is -.135, t is -2.90 and these results are statistically significant at p < .01 level. Hence Hypothesis 6b is supported. In other words, the results indicate

> **that there is a** statistically **significant relationship between Managerial** Ties with Universities **and/** **26**

or other Research Centers and Out-bound Open Innovation. Hypothesis 7: the relationship between Highly Integrative Culture and Open Innovation Hypothesis 7a: Highly Integrative Organizational Culture relates positively to In-bound Open Innovation.

> **The results of the hierarchical** multiple **regression in Table** 4.21 below **with** **50**

regard to the relationship between the predictor variable, Highly Integrative Organizational Culture (dummy variable) and the criterion variable, In-bound Open Innovation, show that the unstandardized regression coefficient is .546, t is 9.90 and these results are statistically significant at p < .01 level. Hence Hypothesis 7a is supported. The unstandardized regression coefficient for Highly Integrative Organizational Culture is interpreted in relation to the reference category Moderately Integrative Organizational Culture. Therefore, the results indicate that facilitation of Open Innovation is .546-points higher if an organization has Highly Integrative Culture as compared to the case when the organization has Moderately Integrative Organizational Culture. Hypothesis 7b: Highly Integrative Organizational Culture relates positively to Out-bound Open Innovation. The

> **results of the hierarchical** multiple **regression in Table 4.** **12**

21 below with regard to the relationship between the predictor variable, Highly Integrative Organizational Culture (dummy variable) and the criterion variable, Out-bound Open Innovation, show that the unstandardized regression coefficient is .179, t is 1.93 and these results are not statistically significant at p < .05 level. Hence Hypothesis 7b is not supported. The unstandardized regression coefficient for Highly Integrative Organizational Culture is interpreted in relation to the reference category Moderately Integrative Organizational Culture. Therefore, the results indicate that Highly Integrative Culture does not facilitate Out-bound Open Innovation. Hypothesis 8: the relationship between Hierarchy Culture and Open Innovation Hypothesis 8a: Hierarchy Organizational Culture relates negatively to In-bound Open Innovation. The

> **results of the hierarchical** multiple **regression in Table 4.** **12**

21 below with regard to the relationship between the predictor variable, Hierarchy Organizational Culture (dummy variable) and the criterion variable, In-bound Open Innovation, show that the unstandardized regression coefficient is -.252, t is -3.61 and these results are statistically significant at p < .01 level. Hence Hypothesis 8a is supported. The unstandardized regression coefficient for Hierarchy Organizational Culture is interpreted in relation to the reference category Moderately Integrative Organizational Culture. Therefore, the results indicate that facilitation of Open Innovation is .252-points lower if an organization has Hierarchy Organizational Culture as compared to the case when the organization has Moderately Integrative Organizational Culture. Hypothesis 8b: Hierarchy Organizational Culture relates negatively to Out-bound

Open Innovation.

> **The results of the hierarchical** multiple **regression in Table** 4.21 below **with** **50**

regard to the

> **relationship between the predictor variable,** Hierarchy Organizational Culture **and the** criterion **variable,** **54**

Out-bound Open Innovation, show that the unstandardized regression coefficient is -.179, t is -1.52 and these results are not statistically significant at p < .05 level. Hence Hypothesis 8b is not supported. In other words,

> **the results indicate that there statistically** no **significant** relationship **between** Hierarchy Organizational Culture **and** **332**

Out- bound Open Innovation. Table 4.21 also shows that the R 2 Change after introducing the predictor variables into the hierarchical multiple regression models is .58 and 22.3 for In-bound and Out-bound Open Innovation respectively. Thus the predictor variables of this study account for 58% and 22.3% of the variance in the criterion variables In-bound Open Innovation and Out-bound Open Innovation respectively. 4.12.2 Testing Moderating Effects of Regimes of Appropriability One of the aims of

> **this study** is **to** test **the moderating effect of** Regimes of Appropriability **on the** relations **between** **146**

all the predictor variables and the criterion variables. In

> **this study, the moderating effect of** **88**

Regimes of Appropriability was analyzed using hierarchical multiple regression. Hierarchical multiple regression has been used in many studies to test the moderating effect (e.g. Yiing & Ahmad, 2009). This researcher

> **followed the procedure** delineated **by Baron and Kenny (1986) to test** **302**

for moderation; and as a result interaction terms were obtained and introduced in Step 4 of the hierarchical regression models. In general, the moderating role of Regimes of Appropriability was not found to be statistically significant. In addition, Table 4.21 also shows that the R 2 Change after introducing the interaction terms into the hierarchical multiple regression models in Step 4 is 0.020 and 0.032 for In-bound and Out-bound Open Innovation respectively. Thus the interaction terms of this study explain only 2% and 3.2% of the variance in the criterion variables In-bound Open Innovation and Out-bound Open Innovation respectively. Therefore the present study concludes that in general Regimes of Appropriability does not moderate the relationships between: 1. Organizational Citizenship Behaviours and any of the two dimensions of Open Innovation 2. Organizational Culture and any of the two dimensions of Open Innovation 3. Managerial Ties and any of the two dimensions of Open Innovation. However, while Regimes of Appropriability was not found in general to moderate the relationships

> **between the predictor variables and the** criterion variables **of this** **101**

**study,**

one weak moderating effect was noticed. This and other details of the results of moderation are discussed below. Hypothesis 9: the moderating effect of Regimes of Appropriability between Organizational Citizenship Behaviours and Open Innovation Hypothesis 9a: Regimes of Appropriability moderates the relationship between OCBs and In-bound Open Innovation. The results of hierarchical multiple regression in Table 4.21 below with regard to the moderating effect of Regimes of Appropriability on the relationship

**between the predictor variable,** Organizational Citizenship Behaviours **and the criterion variable, In-** 65

bound Open Innovation, show that only one interaction term between Regimes of Appropriability and Sportsmanship (one dimension of Organizational Citizenship Behaviours) is

**significant at p < .05 level** with **the** unstandardized **regression** coefficient being .056 **and** 387

t equaling 2.20. Hence Hypothesis 9a is partially supported. Therefore, it is concluded that Regimes of Appropriability moderate the relationship between Organizational Citizenship Behaviours and In-bound Open Innovation with respect to only one dimension of OCB i.e. Sportsmanship. Hypothesis 9b: Regimes of Appropriability

**moderate the relationship between OCBs and** Out-bound **Open Innovation.** 1

The results of hierarchical multiple regression in Table 4.21 below with regard to the moderating effect of Regimes of Appropriability on the

**relationship between the predictor variable,** Organizational Citizenship Behaviours **and the** criterion **variable,** 54

Out-bound Open Innovation, show that none of the interaction terms between Regimes of Appropriability and any dimension of Organizational Citizenship Behaviours is significant at p < .05 level. Hence Hypothesis 9b is not supported. Therefore, Regimes of Appropriability

**does not** moderate **the relationship between Organizational Citizenship** Behaviours **and** 222

Out-bound Open Innovation. Hypothesis 10: the moderating effect of Regimes of Appropriability between Managerial Ties and Open Innovation Hypothesis 10a: Regimes of Appropriability moderates the relationship between Managerial Ties and In-bound Open Innovation. The results of hierarchical multiple regression in Table 4.21 below with regard to

**the moderating effect of** Regimes of Appropriability **on the relationship between** the predictor variable, **Managerial** Ties **and the** 9

criterion variable, In-bound Open Innovation, show that none of the interaction terms between Regimes of Appropriability and any dimensions of Managerial Ties is significant at p < .05 level. Hence Hypothesis 10a

is not supported. Therefore, Regimes of Appropriability does not

**moderate the** relationship **between Managerial Ties and** In-bound Open **Innovation.** **84**

Hypothesis 10b: Regimes of Appropriability

**moderate the** relationship **between Managerial Ties and** Out-bound Open **Innovation.** **84**

The results of hierarchical multiple regression in Table 4.21 below with regard to

**the moderating effect of** Regimes of Appropriability **on the relationship between** the predictor variable, **Managerial** Ties **and the** **9**

criterion variable, Out-bound Open Innovation, show that none of the interaction terms between Regimes of Appropriability and any dimensions of Managerial Ties is significant at $p < .05$ level. Hence Hypothesis 10b is not supported. Therefore, Regimes of Appropriability does not moderate the relationship between Managerial Ties and Out-bound Open Innovation. Hypothesis 11: the moderating effect of Regimes of Appropriability

**between Organizational Culture and** Open **Innovation** Hypothesis 11a: Regimes **of** **125**

Appropriability moderates the

**relationship between Organizational Culture and In-** bound Open Innovation. **The** results **of** **420**

hierarchical multiple regression in Table 4.21 below with regard to the moderating effect of Regimes of Appropriability

**on the relationship between the predictor** variable, Organizational Culture **and the criterion** variable, **In-** **181**

bound Open Innovation, show that none of the interaction terms between Regimes of Appropriability and dimensions of Organizational Culture (introduced in the model as dummy variables) is significant at $p < .05$ level. Hence Hypothesis 11a is not supported. Therefore, Regimes of Appropriability does not moderate the relationship between Organizational Culture and In- bound Open Innovation. Hypothesis 11b: Regimes of Appropriability moderates the relationship between Organizational Culture and Out-bound Open Innovation. The results of hierarchical multiple regression in Table 4.21 below with regard to the moderating effect of Regimes of Appropriability

**on the relationship between the predictor** variable, Organizational Culture **and the criterion** **181**

variable, Out-bound Open Innovation, show that none of the interaction terms between Regimes of

Appropriability and dimensions of Organizational Culture (introduced in the model as dummy variables) is significant at p < .05 level. Hence Hypothesis 11b is not supported. Therefore, Regimes of Appropriability does not moderate the relationship between Organizational Culture and Out-bound Open Innovation. Table 4.21: Results of hierarchical multiple regressions Criterion Variable → In-bound OI Out-bound OI Step 1: Control Variables Industry Type Firm Ownership Step 2: Predictor Variables Altruism Conscientiousness Sportsmanship Ties with Govt. Officials Ties with Managers Ties with Research Centers Highly Integrative Culture Δ Hierarchy Culture Step 3: Moderator Unstandardized Coefficients Std. B Error -.013 .010 .030 .029 .052 * .023 .050 * .023 .066 ** .024 .090 ** .029 -.012 .024 .117 ** .028 .546 ** .055 -.252 ** .070 t -.42 .34 2.26 2.18 2.70 3.09 -.490 4.23 9.90 -3.61 Unstandardized Coefficients Std. B error -.054 .025 .169 ** .138 ** .188 ** -.026 -.054 -.135 ** .179 -.179 .037 .035 .039 .039 .041 .049 .040 .047 .093 .118 t -2.47 1.55 4.32 3.57 4.56 -.52 -1.35 -2.90 1.93 -1.52 Regimes of Appropriability (RA) .118 ** .030 3.87 .164 ** .051 3.19 Step 4: Interaction Terms RA x Altruism RA x Sportsmanship RA x Conscientiousness RA x Ties with Managers RA x Ties with Research Centers RA x Ties with Govt. Officials RA x Highly Integrative Culture RA x Hierarchy Culture R 2 change

**Step 1 Step 2 Step 3 Step 4** F change **Step 1 Step 2 Step 3 Step 4** **12**

.006 .056 * .047 -.013 .026 -.049 -.063 -.155 .001 .580 .018 .020 .024 .026 .024 .023 .025 .027 .064 .088 .263 2.20 1.91 -.56 1.03 -1.82 -.99 -1.76 .017 .076 .021 .002 .049 .080 -.080 -.061 .010 .223 .023 .032 .186 1.617 56.698 ** 11.926 ** 14.998 ** 10.203 ** 2.135 * 1.819 Note: *p<0.05; ** p<0.01. Δ Moderately Integrative Culture is the reference category for the dummy variables. .022 .095 .027 .004 .074 .104 -.061 -.039 4.35 3.24 3.42 -1.13 -3.20 -.62 .18 -.75 4.13

**Summary This chapter** presented **the data analysis** exercise **and** the findings of **this study.** The first section **of** **191**

this chapter dealt with the coding of data, reverse scoring of the items, and missing values. In the second section, descriptive statistics were presented and a summary of the

**demographic profile of the respondents** and the firms **that participated in this study** was given. In **the** **105**

third section, multivariate assumptions including normality, outliers linearity, homoscedasticity and multicollinearity were examined. The fourth and the fifth sections of this chapter showed the results of the tests for non-response

**bias and common method bias** respectively. **In the** sixth **section,** **215**

purity of the scales used in this study was assessed using item

**-total-correlation and Cronbach's alpha. The** seventh section presented **the** **214**

results of

**exploratory factor analysis** conducted **on all variables** of this study. **In the** **80**

eighth section, the

**results of the** exploratory **factor analysis** with **the**'offending' items dropped **were** presented. **In the** 329

ninth section, reliability of the scale without the 'offending' items was examined. The tenth section dealt with confirmatory factor analysis and construct validity including discriminant validity and convergent validity. In the eleventh

**section of this chapter, the** results **of** cluster **analysis** performed **on the** 130

dimensions of Organizational Culture were presented. This section was followed by the twelfth section in which hypotheses of this study were tested. In the next chapter,

**Chapter 5, the findings of this study are** 136

discussed. In addition to

**comparing and** relating **the findings of this study** with **the** findings of **other** similar **studies,** 28

the theoretical and managerial contributions are also highlighted.

**The chapter also** presents **the limitations of this research** 116

besides offering

**recommendations based on the findings of this study. The** 348

chapter ends by highlighting future areas of research. CHAPTER 5 DISCUSSION AND CONCLUSION

**5.0 Introduction This chapter discusses results of the data analysis** presented **in** 281

the previous chapter. The first section of this chapter gives a brief summary of this study, highlighting the research questions, the objectives, how those objectives were accomplished and using what statistical techniques. The summary is given so that it presents a microcosmic picture of this research. The second section dwells upon what is the main purpose of this chapter: to state, explain, discuss, relate and put into proper perspective the findings of this study. The second section is further divided into seven (7) sub-sections. The first and second sub- sections deal with the relationships between the dimensions of Organizational Citizenship Behaviours, and In-bound Open Innovation and Out-bound Open Innovation. The third and fourth sub-sections deal with the relationships of dimensions of Managerial Ties with In- bound Open Innovation and Out-bound Open Innovation. The fifth and sixth sub-sections deal with the relationships of the two types Organizational Culture with In-bound Open Innovation and Out-bound Open Innovation. The seventh sub-section deals with the hypothesized moderating role that Regimes of Appropriability plays on the relationships between the dimensions/types of the predictor variables and dimensions of the criterion variable. The third section of this chapter, divided into two sub-sections, deals with the

**contribution of** this **study to theory and** managers/practitioners. **In the** 99

fourth **section, limitations**

of this research are discussed while in the fifth section, future research directions are given. 5.1 Summary of the research This research was conducted with the aim to study the effects of Organizational Citizenship Behaviours, Organizational Culture and Managerial Ties on

**Open Innovation and** to study **the moderating** role **of Regimes** of Appropriability **on these** **1**

relationships. Specifically the following four research questions were investigated: •

**What is the nature of relationship between** different **dimensions** **408**

of Organizational Citizenship Behaviors and Open Innovation? • What is the

**nature of relationship between different types of** Managerial Ties **and** **85**

Open Innovation? • What is the

**nature of relationship between different types of** Organizational Cultures **and** **85**

Open Innovation? • What is the

**moderating role of Regimes** of Appropriability **on the** relations **between** the predictors **and** **1**

criterion variables of this study? This research investigated the above research questions by pursuing the following four research objectives: •

**To examine the effects of** different dimensions of **Organizational Citizenship** Behaviors **on** **58**

Open Innovation. •

**To examine the effects of different types of** Managerial Ties **on** **53**

Open Innovation. •

**To examine the** effect **of different types of** Organizational Cultures **on** **53**

Open Innovation. •

**To investigate the moderating effect of** Regimes of Appropriability **on the relations between** **88**

Organizational Citizenship Behaviors, Managerial Ties and Organizational Culture, and Open Innovation. The above objectives of this study were achieved as follows. This being a positivist study, it aims at measuring objectively the social phenomena, in this case, the relationships between Organizational Citizenship Behaviours, Organizational Culture, Managerial Ties and Open Innovation under the moderating effect of Regimes of Appropriability. A cross-sectional study, using the survey method was done to meet these objectives of the study. The data were

**collected over a** five **-month period from** January 2012 **to** May 2012. **The** 393

population of this study was the middle and top managers working in the Malaysian manufacturing firms operating in the four industries classified as high-tech: Aerospace,

**Computers and office machinery, Electronics and communication, and** 47

Pharmaceuticals. The manufacturing sector, as opposed to the services sector, was chosen in this study because the

**incidence and adoption of Open Innovation** is anticipated to **be stronger in manufacturing** 4

sector (van de Vrande et al., 2009). Following the guidelines laid down in the Oslo Manual (2005), certain sampling constraints were applied. The responding firm, as a result, were required to have

**a Research and Development (R&D) department and** 224

only the firms that met this requirement were approached. Besides, the respondents were required to have served the same organization for at least five (5) years. This study used a two-stage sampling procedure (Davis, 2005) involving stratified sampling and convenience sampling techniques. In the first stage, stratified sampling was used and the high-tech industry was sub-divided into four (4) industries.

**In the second stage,** convenience **sampling was used to** select firms from **the** 48

four industries. This study involved two sampling frames. The first sampling frame was taken from Malaysian Manufacturers' Directory (2011). An updated list of the manufacturing firms operating in three (3) high-tech industries was retrieved. A total of 76 organizations in

**Computers and office machinery** industry, 135 in **Electronics and communication** industry **and** 47

35 in Pharmaceuticals industry were short-listed and contacted. In addition, a Pharmaceutical exposition held in Kuala Lumpur from April 17-19, 2012 provided an opportunity to the researcher to collect more data from the Malaysian pharmaceutical companies. The second sampling frame of this study involved the fourth high-tech industry, the Aerospace industry. As aerospace firms were not indexed in the Malaysian Manufacturers' Directory (2011), a list of firms operating in the Aerospace industry was retrieved from the Aerospace Industry Report (AIR) Online Database. This researcher was able to retrieve a list of 233 aerospace firms from the database (Malaysian Aerospace Council, 2011). However, a large number of these

firms provided services to their customers and, thus could not form the sample of

| | |
|---|---|
| this study. For the purpose of this study, | 91 |

only forty-eight firms were considered appropriate and were approached.

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|---|---|
| The variables of interest in this study were | 98 |

measured with items adapted from various past studies. A survey

| | |
|---|---|
| questionnaire was designed to elicit responses from the respondents with respect to | 1 |

Organizational Citizenship Behaviours (predictor variable), Organizational Culture (predictor variable), Managerial Ties (predictor variable), Regimes of Appropriability (moderating variable) and Open Innovation (criterion variable). In addition, questions related to the firm profile were also asked in the questionnaire. Keeping in mind the problems method biases can cause, several precautionary measures were taken in this study right from the questionnaire designing stage to reduce any potential effects of CMB and CMV and thus ground was prepared for obtaining valid findings. Furthermore, validity of the questionnaire was tested as suggested by Cavana et al. (2001). To check

| | |
|---|---|
| reliability of the measures, a pilot-test was conducted | 114 |

before distributing the questionnaire on a full scale. Questionnaires were distributed among students from three faculties of the University of Malaya namely:

| | |
|---|---|
| Faculty of Computer Sciences, Faculty of Engineering and Faculty of Business and | 221 |

Accountancy. Constraints were applied and only the post-graduate students with previous work experience were targeted. Reliability was assessed using Cronbach's alpha which was found to be above the .60 threshold for all the variables, thus confirming reliability of the measures

| | |
|---|---|
| used in this study (Hair et al., 2010). In addition, the pilot test | 78 |

helped in rectifying some minor questionnaire-design related issue as highlighted by the respondents. After the pilot test,

| | |
|---|---|
| questionnaires were distributed to the'real' respondents working in firms operating in the | 360 |

Malaysian high-tech sector. The questionnaires were administered by email and in person. Pursuant to data collection, the data collected were analyzed quantitatively. Several statistical techniques were used. IBM SPSS ® Statistics v.20 and

| | |
|---|---|
| Analysis of Moment Structures v.18 (AMOS™) were used to run the | 143 |

relevant statistical tests. After running descriptive and frequency tests, the

> **exploratory factor analysis** (EFA) was **used to** establish **dimensionality of** items/questions **and** — 78

reduce those items (of the variables) to factors. This study used the Bartlett test of sphericity to determine whether EFA was appropriate for the data of this study. Besides, Kaiser-Meyer-Olkin (KMO) was also used. The results obtained in EFA

> **were used to** guide **the confirmatory factor analysis** (CFA). Post CFA, **the** — 206

confirmed latent variables/factors were used to test

> **relationships among the variables of interest in this study.** — 202

In this study, the criterion variable, Open Innovation, has two dimensions: In-bound Open Innovation and Out-bound Open Innovation. Therefore to assess contribution of the predictor variables in predicting both the dimensions of the criterion variable, two separate hierarchical multiple regressions were conducted

> **to test** all **the hypotheses. In** addition, **this study** checked whether Regimes **of** — 406

Appropriability moderated the relationships between the dimensions of the predictor variables and the criterion variables (In-bound and Out-bound Open Innovation). This was tested again using hierarchical multiple regression by

> **following the procedure** delineated **by Baron and Kenny (1986), which** — 8

involves creating interaction terms between all the dimensions of the predictor variables and the moderating variable which were later introduced in the regression model. 5.2 Discussion of Findings This study was undertaken with the purpose to study the effects of Organizational Citizenship Behaviours, Organizational Culture, and Managerial Ties on In-bound and Out- bound dimensions of Open Innovation. The

> **purpose of this study was** also **to investigate the moderating** role **of** Regimes of Appropriability **on the relationships between** — 146

the above predictor variables and the criterion variables. These hypothesized relationships were encapsulated in twenty-two (22) hypotheses developed for this study. Six (6) hypotheses each related to the

> **relationships between the** criterion **variable** Open Innovation **and the** two **predictor variables** — 187

namely Organizational Citizenship Behaviour and Managerial Ties while four (4) hypotheses related

> **to the relationship between Open Innovation and Organizational** — 407

Culture. Another six (6) hypotheses related to the moderating role of Regimes of Appropriability

**on the relationships between the predictor variables and** 101

two dimensions of Open Innovation (In-bound and Out-bound Open Innovation). Overall, out of the twenty-two (22) hypotheses of this study, eleven (11) were supported; one (1) was partially supported while ten (10) were not supported. Table 5.1 below summarizes the findings of this study. Table 5.1: Summary of findings

**Research Questions Research** Objectives Research **Hypotheses** Findings **What is the** nature **of** 136

relationship between different dimensions of Organizational Citizenship Behaviors and Open Innovation? What is the

**nature of relationship between different** type **of** Organizational Cultures **and** 85

Open Innovation? What is the

**nature of relationship between different types of** Managerial Ties **and** 85

Open Innovation? What is the

**moderating role of Regimes** of Appropriability **on the** relations **between** the predictors **and** 1

criterion variables of this study?

**To examine the effects of** different dimensions of **Organizational Citizenship** Behaviors **on** 58

Open Innovation.

**To examine the** effect **of different types of** Organizational Cultures **on** 53

Open Innovation.

**To examine the effects of different types of** Managerial Ties **on** 53

Open Innovation.

**To investigate the moderating effect of** Regimes of Appropriability **on the relations between** OCBs, Managerial Ties **and** 88

Organizational Culture, and Open Innovation. OCB and Open Innovation H1a:

> **There is a positive relationship between** Altruism **and** In- bound Open **Innovation** **8**

in that Altruism facilitates In-bound Open Innovation. H1b:

> **There is a positive relationship between** Altruism **and** Out- bound Open **Innovation** **8**

in that Altruism facilitates Out-bound Open Innovation. H2a:

> **There is a positive relationship between** Conscientiousness **and** In-bound Open **Innovation** **8**

in that Conscientiousness facilitates In-bound Open Innovation. H2b:

> **There is a positive relationship between** Conscientiousness **and** Out-bound Open **Innovation** **8**

in that Conscientiousness facilitates Out- bound Open Innovation. H3a:

> **There is a positive relationship between** Sportsmanship **and** In- bound Open **Innovation** **8**

in that Sportsmanship facilitates In-bound Open Innovation. H3b:

> **There is a positive relationship between** Sportsmanship **and** Out-bound Open **Innovation** **8**

in that Sportsmanship facilitates Out-bound Open Innovation. Organizational Culture and Open Innovation H7a: Highly integrative Organizational Culture relates positively to In-bound Open Innovation. H7b: Highly integrative organizational relates positively to Out- bound Open Innovation. H8a: Hierarchy Organizational Culture relates negatively to In- bound Open Innovation. H8b: Hierarchy Organizational Culture relates negatively to Out- bound Open Innovation. Managerial Ties and Open Innovation H4a: Managerial Ties with Government Officials facilitate In-bound Open Innovation. H4b: Managerial Ties with Government Officials facilitate Out- bound Open Innovation. H5a:

> **Managerial Ties with Managers at other firms** **9**

facilitate In- bound Open Innovation. H5b:

> **Managerial Ties with Managers at other firms** **9**

facilitate Out- bound Open Innovation. H6a: Managerial

**Ties with Universities and/** or **other Research Centers** 24

facilitate In-bound Open Innovation. H6b: Managerial

**Ties with Universities and/** or **other Research Centers** 24

facilitate Out-bound Open Innovation. Regimes of Appropriability and Open Innovation H9a: Regimes of Appropriability moderates the relationship between OCBs and In-bound Open Innovation. H9b: Regimes of Appropriability moderates the relationship between OCBs and Out-bound Open Innovation. H10a: Regimes of Appropriability moderates the relationship between Managerial Ties and In-bound Open Innovation. H10b: Regimes of Appropriability moderates the relationship between Managerial Ties and Out-bound Open Innovation. H11a: Regimes of Appropriability moderates the

**relationship between Organizational Culture and** In-bound Open **Innovation.** H11b: Regimes **of** 125

Appropriability

**moderates the relationship between Organizational Culture and** 165

Out-bound Open Innovation. Supported Supported Supported Supported Supported Supported Supported

**Not Supported** Supported **Not Supported Supported Not Supported Not Supported Not Supported Supported Not Supported** Partially **Supported Not Supported** Not **Supported Not Supported Not Supported Not Supported** 28

5.2.1 Organizational Citizenship Behaviours and In-bound Open Innovation Three (3) hypotheses

**of this study** related **to** the **relationships between** three dimensions **of the** predictor variable, **Organizational** 336

Citizenship Behaviours and one dimension of the criterion variable, In-bound Open Innovation. The three dimensions of Organizational Citizenship Behaviours used in this study are: Altruism, Conscientiousness and Sportsmanship. Hypothesis H1a

**hypothesized a positive relationship between** Altruism **and** In-bound **Open Innovation.** 37

The findings of this study show that this hypothesis is supported in the context of the current study. As a result,

**it can be inferred that** when **the employees of** an **organization** 94

work altruistically, it leads to greater facilitation of In-bound Open Innovation. Hypothesis H2a

**hypothesized a positive relationship between** Conscientiousness **and** In-bound **Open Innovation.** 37

The findings of this study show that this hypothesis is also supported in the context of the current study. As a result,

**it can be inferred that** when **the employees of** an **organization** 94

display Conscientiousness, it leads to greater facilitation of In-bound Open Innovation. Hypothesis H3a

**hypothesized a positive relationship between** Sportsmanship **and** In-bound **Open Innovation.** 37

The findings of this study show that this hypothesis is supported as well in the context of the current study. As a result,

**it can be inferred that** when **the employees of** an **organization** 94

exhibit Sportsmanship, it leads to greater facilitation of In-bound Open Innovation.

**Of the** three **hypothesized relationships between the** dimensions **of Organizational** Citizenship Behaviours **and** 126

In- bound Open Innovation, the one with Sportsmanship was found to be the strongest (significant unstandardized coefficient = .066, p<.01), followed by the relationship with Altruism (significant unstandardized coefficient = .052, p<.05), and Conscientiousness (significant unstandardized coefficient = .050, p<.05). Organizations see Open Innovation as 'primarily a people-driven process (Golightly, Ford, Sureka, & Reid, 2012, p. 62). Therefore the role of people becomes paramount in the Open Innovation process. Organizational Citizenship Behaviours exhibited by an organization's members are known to affect several aspects of an organization including firm performance

**(Organ et al.,** 2005; **Podsakoff et al., 1997; Podsakoff & Mackenzie,** 340

1994). Dennis Organ, the pioneering researcher who introduced the term Organizational Citizenship Behaviours highlighted that in isolation any one instance of Organizational Citizenship Behaviours may be insignificant, but in the aggregate this discretionary behaviour has a major beneficial impact on organizational operations and effectiveness. This study's findings however show that all the dimensions of Organizational Citizenship Behaviours, even in isolation, affect Open Innovation. Innovation has been called

**a highly complex social process** requiring **effective interaction of a large number of individuals and sub-units within the innovating** organization **(Zaltman,** Duncan, & Holbek, **1973).** 74

On the other hand, Open Innovation involves

**a high degree of** uncertainty **both in terms of exploration for better** 1

**partners and outcomes of such** partnerships. **It is** therefore not surprising **that**

Sportsmanship is found to have the strongest effect on In-bound Open Innovation. Sportsmanship helps employees

**maintain a positive attitude even when things go** 142

wrong or when there are minor setbacks. When needed, an organization's employees may even be willing to give up

**personal interests for the good of the** organization **and** 142

show

**tolerance of less than ideal** work **conditions without complaining (Podsakoff**& Philip, **1990).** 20

Thus

**employees, who exhibit sportsmanship, by demonstrating a willingness to take on new responsibilities or learn new skills, enhance the organization's ability to adapt to changes in its environment (Podsakoff & MacKenzie, 1997).** 58

In general, the significant

**impact of Organizational Citizenship Behaviours on** In-bound **Open Innovation** 1

seems to be logical.

**Shifting from a closed innovation paradigm to an Open Innovation paradigm** can **entail scarcity or unpreparedness of resources or teething problems.** In addition, **managers** 1

may not be able to foresee all uncertain events

**or fully** expect **the activities that they may desire or need employees to perform (Katz & Kahn, 1978; Organ, 1988).** 1

In such a situation, Organizational Citizenship Behaviours shown by the employees, as this study shows, can go a long way in facilitating In-bound Open Innovation. The above findings can also be looked at from the perspective of pro-social behaviour. Pro- social behaviour includes positive social acts such as

**helping, sharing, donating,** co- operating, **and volunteering** which are **carried out to produce and maintain the well-being and integrity of** 203

**others.**

Altruism, which is studied as a dimension of Organizational Citizenship Behaviours in this study, is a particular form of pro-social behaviour that is performed by an organization's members, is directed towards an individual or organization and is

**performed with the intention of promoting welfare of the individual or organization** 267

(Brief & Motowidlo, 1986). This study's findings show that Altruism is linked significantly and positively to In-bound Open Innovation, and logically so. Altruism involves behaviours such as "cooperating with co-workers, taking action when necessary to protect the organization from unexpected danger, suggesting ways to improve the organization, deliberate self-development and preparation for higher levels of organizational responsibility, and speaking favorably about the organization to outsiders. This is vital for organizational survival. As a result of practicing Altruism, an individual can act spontaneously and voluntarily to promote the organization's interests and contribute to the accomplishment of organizational objectives – in this case facilitation of In-bound Open Innovation. In addition, Open Innovation involves dynamic and changing environments. In order to respond to the challenges Open Innovation poses, organizations often need to change their work methods, policies and procedures. Employees' own initiatives and ideas can significantly contribute to these processes since the employees often know best the current practices and their weaknesses (Lawler, 1992; Seppälä, Lipponen, Bardi, & Pirttilä- Backman, 2012). Thus performing Organizational Citizenship Behaviours – argued by Organ (1997) as behaviours often regarded by organizational officials as even more important than exceptional productivity – can help organizations in facilitating Open Innovation. Furthermore, Maria, Tobias, and Susanne (2009) pointed to the role of the individual that is supposed to be part of Open Innovation scheme and suggested investigating the motivation for the employee to engage in practices that may be beyond the scope of his/her work". Such motivations,

**it can be concluded** in view of **the findings of this study, are** 188

perhaps the same that make employees practice Organizational Citizenship Behaviours. 5.2.2 Organizational Citizenship Behaviours and Out-bound Open Innovation Three (3) hypotheses

**of this study** related **to the relationships between** three **dimensions** of **the** 133

predictor variable, Organizational Citizenship Behaviours and one dimension of the criterion variable, Out-bound Open Innovation. Hypothesis H1b

**hypothesized a positive relationship between** Altruism **and** Out-bound **Open Innovation.** 37

The findings of

**this study** show **that** this **hypothesis** is **supported. It can be** therefore inferred **that** when **the** 14

employees of an organization display Altruism, it leads to greater facilitation of Out-bound Open Innovation. Hypothesis H2b

**hypothesized a positive relationship between** Conscientiousness **and**

Out-bound **Open Innovation.** 37

The findings show that this hypothesis is supported in this study.

**It can be** therefore **inferred that** when **the employees of** an **organization** 94

display Conscientiousness, it leads to greater facilitation of Out-bound Open Innovation. Hypothesis H3b

**hypothesized a positive relationship between** Sportsmanship **and** Out-bound **Open Innovation.** 37

The findings of

**this study** show **that** this **hypothesis** is **supported. It can be** therefore inferred **that** when **the** 14

employees of an organization display Sportsmanship, it leads to greater facilitation of Out- bound Open Innovation. Of the three hypothesized relationships between the dimensions of Organizational Citizenship Behaviours and Out-bound Open Innovation, the one with Sportsmanship was found to be the strongest (significant unstandardized coefficient = .188, p<.01), followed by the relationship with Altruism (significant unstandardized coefficient = .169, p<.01), and Conscientiousness (significant unstandardized coefficient = .138, p<.01). There does not seem to be any existing literature that supports or refutes these findings. The process of Out-bound Open Innovation, just like the process of In-bound Open Innovation, involves

**a high degree of** uncertainty **both in terms of exploration for better partners and outcomes of such** 1

partnerships. In the Out-bound Open Innovation process, firms want

**to license their own technology to other firms either exclusively or in addition to its application in their own products** (Lichtenthaler, 2010b). **This** 21

study's findings show that the relationships between different dimensions of Organizational Citizenship Behaviours do not change with respect to In-bound Open Innovation and Out-bound Open Innovation. Sportsmanship, Altruism and Conscientiousness, in the order of appearance, remain the strongest predictors of both In-bound Open Innovation and Out-bound Open Innovation. These findings can be explained in light of programs like the 'integrated technology commercialization roadmap' and

**'strategic technology planning to outward technology transfer' which,** 21

Lichtenthaler (2010b) suggests, can help organizations overcome managerial difficulties in actively licensing technology. Since Organizational Citizenship Behaviours was found to positively impact Out-bound Open Innovation in the firms surveyed for this study, organizations can make Organizational Citizenship Behaviours a focus of such programs which will in turn help managers deal with the problems involved in commercialization of technology. Currently it is not clear what all factors affect the success of Out-bound Open Innovation. Lichtenthaler and Ernst (2009) mention one factor,

> **strategic openness,** as **a necessary condition for actively licensing technology.** 21

However, the authors note that this factor

> **is most likely insufficient for establishing a successful out-licensing program.** 21

In view of the results of this study, it seems that Organizational Citizenship Behaviours performed by the employees of an organization can go a long way in facilitating Out-bound Open Innovation. Organizations can foster Organizational Citizenship Behaviours to facilitate Out-bound Open Innovation by developing practices related to

> **recruitment and selection, training and development,** and **performance appraisal** and **compensation/benefits** 318

(Bolino, Turnley, & Averett, 2003). Bolino et al. (2003) and Grant and Mayer (2009) discuss ways in which Organizational Citizenship Behaviours can be fostered in organizations. Organizations, for instance, can

> **use selection procedures that are predictive of employee citizenship** or they **seek out applicant pools** comprising **individuals committed to causes than themselves.** 22

Similarly organizations can

> **sponsor training programs that teach cooperation or the importance of taking** initatives **and exceeding one's formally prescribed job duties.** 22

In addition, organizations can

> **reward citizenship** behaviours **by focusing on the extent to which employees engage in such behavior** besides **their prescribed job duties. Compensation** 22

systems can also be

> **linked to group- or organizational-level outcomes** while **employees** 22

engaging in

> **competitive or non- cooperative behaviors that are inconsistent with the notion of good citizenship** 22

should not be rewarded. All these steps – in addition to initiating a

> **flexible and family-friendly workplace that** shows **appreciation for employees and** makes **it easier for them to go beyond the call of duty** 22

– can positively impact the Out-bound Open Innovation efforts of an organziation. 5.2.3 Managerial Ties and In-bound Open Innovation According to Martino (2011), managers' talent for

> **relationship building both within and outside the organization is** one of **the** 323

critical personal competencies needed for Open Innovation success.

> **Sakkab (2002)** and **Huston and Sakkab (2006)** 176

state that

> **exploitation of personal** relationships **of the managers** 176

helps firms pursue Open Innovation 'easily and deeply' as managers' personal relationships help start technological collaborations, evaluate the collaboration's objectives and risks formally, and analyze and select

> **potential partners with a formal and explicit process** 176

(Lazzarotti, Manzini, & Pellegrini, 2010). Enough evidence exists in the literature to support the view that networking ties impact innovation (Gronum, Verreynne, & Kastelle, 2012; Su, Tsang, & Peng, 2009). In the Triple Helix Model, the national innovation systems involve three players: the state, industries and universities (Leydesdorff, 2012). While the state plays its role by devising appropriate innovation policies and building basic structures, the industry converts the R&D outputs into profitable goods; and the universities cultivate research talents and conduct academic research (Leydesdorff, 2012). In case of Open Innovation, the very definition of this construct implies establishment of ties of a firm with other organizations. Therefore in a good networking culture, employees develop and nurture internal and external relationships that

> **support the innovation strategy of the organization** (Lindegaard, 2011). **In this** 356

backdrop, three (3) hypotheses of

> **this study** related **to the relationships between** the three **dimensions** of **the** 133

predictor variable, Managerial Ties and one dimension of the criterion variable, In-bound Open Innovation. Hypothesis H4a hypothesized a positive relationship between Managerial Ties with Government Officials and In-bound Open Innovation. The findings of

> **this study** show **that** this **hypothesis** is **supported.** Therefore, **it can be** concluded **that** 14

ties of managers of the surveyed organizations with government officials facilitate In-bound Open Innovation. It is not surprising to see the significant and positive effect of Managerial Ties with Government Officials on In-bound Open Innovation as political ties can provide information and knowledge related to government policies and regulations (Shu, Page, Gao, & Jiang, 2011). Of the three hypothesized relationships between the dimensions of Managerial Ties and In- bound Open Innovation, the one between Managerial Ties with Government Officials and In-bound Open Innovation was found to be the second strongest (significant unstandardized coefficient = .090, p<.01). This finding however does not seem to concur with Shu et al. (2011) who indicate that political ties of the managers tend to have lesser influence on organizational knowledge creation processes and firm innovation in the closed innovation paradigm. In contrast to this, in a seminal study by

> **Peng and Luo (2000), Managerial Ties with Government Officials** were found **to** help improve **firm performance** **92**

measured financially and strategically (i.e. return on assets and market share). Peng and Luo's (2000) results might seem irrelevant to relate here, however, if In-bound Open Innovation is considered as a measure of

> **firm performance, the** findings **of this study** show **that** Managerial Ties **with** **90**

Government Officials facilitate In-bound Open Innovation as well. In addition, given that Malaysia is a developing country, managers of the sampled organizations, it appears, need to make substantial efforts to establish and maintain personal ties with the officials of

> **regulatory and supporting organizations such as tax bureaus, state banks, and** **61**

other government and bureau officials. That may not be unusual in an emerging economy, like Malaysia, where more fitting, market-supporting institutions and legal systems are relatively weak and because of institutional voids managers often depend on their ties with business community and/or government officials to conduct business and coordinate exchanges (Li, 2008; North, 2005; Peng & Luo, 2000). Hypothesis H5a hypothesized a positive relationship between

> **Managerial Ties with Managers (at other firms)** **9**

and In-bound Open Innovation. The findings of

> **this study** show **that** this **hypothesis** is **not supported.** Therefore, **it can be** concluded **that** **14**

ties of managers of the surveyed organizations with the managers of other firms did not facilitate In-bound Open Innovation. This finding is not consonant with Qin and Shanxing (2010) who studied managerial ties and innovative performance through an Open Innovation perspective among Chinese manufacturing organizations and reported positive association between

> **Managerial Ties with Managers (at other firms)** **9**

and innovative performance 9 . Similarly this finding also does not agree with the case study of Procter &

Gamble (Huston & Sakkab, 2006) which showed that Procter & Gamble encouraged meetings and interactions between their senior leaders and those of the suppliers to

> **improve relationships, increase the flow of ideas and strengthen each company's understanding of the other's capabilities – all of which** helped to **innovate.** **158**

In addition, the finding does not concur with the work of Lindegaard (2011, pp. 54-55) which suggests that for organizations moving towards

> **Open Innovation, 'possibilities include peer-to-peer networks for people working with innovation in different companies, value- and supply-chain networks, feeder networks, and events and** **132**

9 While

> **this study looks at** the **issue from an** 'Open Innovation **perspective',** **220**

it does not seem to be an Open Innovation study as the criterion

> **variable in this study** - Innovative **Performance - is measured by** **414**

focusing on R&D cost reduction, patent counts and new product announcements; and details related to these are not specifically sought with respect to Open Innovation. forums connecting problem solvers and innovators'. The

> **finding is** however **consistent with** Su **et al. (2009) who found** **374**

ties with managers (referred to as 'business ties' in their paper) to be irrelevant to innovation in the closed innovation paradigm. The findings also seem to be consistent with the observation of

> **Cohen and Levinthal (1990)** who, **in the case of** **401**

corporate innovation, pointed out that corporations

> **are not apt to acquire scientific knowledge from the business ties** **84**

(Gao, Xu, & Yang, 2008). The

> **finding is** somewhat **surprising in light of the fact that** **373**

managers of the surveyed firms were expected to contribute to their firms in the exploration and exploitation processes of In-bound Open Innovation (March, 1991). This finding also surprises since in the case of In-bound

> **Open Innovation, firms rely on an extensive use of inter-** **1**

**organizational relationships to internalize external ideas from a variety of external innovation sources and to market the ideas that are developed within the firm but fall outside the firm's current business model (Chesbrough, 2006; Chesbrough et al., 2006).**

It however seems that the firms surveyed in this study relied on ties other than

**ties with managers at other firms to** 9

perform these functions. As the findings show,

**ties with government officials and ties with** 9

universities and/or research centers were preferred to facilitate In-bound Open Innovation by the surveyed firms. Hypothesis H6a hypothesized a positive relationship between Managerial Ties with Universities and/or other Research Centers and In-bound Open Innovation. The findings of

**this study** show **that** this **hypothesis** is **supported.** Therefore, **it can be** concluded **that** 14

ties between managers of the surveyed organizations with Universities and/or other Research Centers facilitated In-bound Open Innovation. Of the three hypothesized relationships between the dimensions of Managerial Ties and In-bound Open Innovation, the one with Managerial Ties with Universities and/or other Research Centers was found to be the strongest (significant unstandardized coefficient = .117, p<.01). This finding confirms many previous studies that focus on the

**relevance of universities and research centers as** collaborators **for** 199

innovation (Chiaroni et al., 2011; Cohen, Nelson, & Walsh, 2002; Philbin, 2008). In particular, the finding is consistent with Su, Tsang and Pengis (2009) who found ties

**with universities and research institutes to** 119

significantly impact product and process innovation. Tödtling, Lehner, and Kaufmann (2009) suggest that firms interacting

**with universities and research organizations**– irrespective of whether **the** 119

relation is based on

**information exchange (informal** links), **contract research (market type)** or **collaborative research (network type)** 119

– access complementary scientific knowledge

> **such as R&D and patents** 119

knowledge that enhances advanced innovation. The finding also concurs with a qualitative study conducted recently in Slovenia by Krapez, Škerlavaj, and Groznik (2012) that promises 'big benefits' in Open Innovation collaborations with research and educational institutions. This finding of the current study is also quite expected and broadly consistent with Fritsch and Rolf (1999) who found

> **that a high level of co-operation between the participants is conducive to the performance of the regional innovation** 118

systems. This findings is also consistent with the work of Qin and Shanxing (2010) who reported

> **a significant positive relationship between** ties **of** managers with **people** in universities **and** 220

public research institutes in the Chinese context. The finding seems to be in line with the observation of

> **Cohen and Levinthal (1990)** who, **in the context of** corporate **innovation,** 353

pointed out that

> **corporations can obtain new scientific knowledge as well as technological knowledge through university ties.** 84

The finding is also consistent with Su, Tsang and Pengis (2009) who in the closed innovation paradigm found ties with universities and research institutes to significantly impact product and process innovation. Universities and research centers

> **play an important** part **in the** national **innovation** systems and, **as** mentioned before, **contribute** 456

by conducting academic research and training the talent (Leydesdorff, 2012). Lindegaard (2011, p. 81) mentions that collaborations of institutions of higher education and research institutes with businesses around the world have gained momentum in recent years with institutions of higher education wanting to commercialize innovations developed on campus. Westhead, Storey, and Britain (1994) speak in a similar vein highlighting that informal links with higher educational institutes can help corporations gain access to knowledge and resources which can facilitate technological innovation and productivity. It may be difficult for firms to contact people like researchers in universities not only because they are outside of their business networks but also because in the case they contacted an academic, it would be confusing to reach the right person in the first place (Cadiou & Boldrini, 2012). Ties of a firm's managers with people in universities and other research centers can thus be a boon for In-bound Open Innovation. In addition, several

> **case studies**– focusing **on prominent high-tech regions like the Silicon Valley,** 118

the Austin/San Antonio Corridor, the Cambridge region, for example – highlight the contribution of universities

and research institutions towards innovation processes. While the higher institutions in Malaysia are relatively new to university-industry collaboration (Othman & Uthayakumaran, 2012), yet many examples of such collaborations exist (Hamdan et al., 2011). As

> **the findings of this study indicate that** ties of **managers** **45**

in the industry with people in universities and other research centers strongly and positively affect facilitation of In-bound Open Innovation, firms that wish to see In-bound Open Innovation facilitated in their organizations should increase their managerial ties with people in the universities and/or research centers. Given that many Malaysian universities figure in the world's top 500 universities list, with ranking and research quality of some of them improving (QS World University Rankings, 2012), university-industry collaboration in Malaysia can prove

> **to be beneficial for all** the **parties involved. The** **213**

benefits can further be increased if organizations give their employees time and means to network and help them polish their personal networking skills (Lindegaard, 2011, p. 55). 5.2.4 Managerial Ties and Out-bound Open Innovation Three (3) hypotheses

> **of this study** related **to the relationships between** the three **dimensions** of **the** **133**

predictor variable, Managerial Ties and one dimension of the criterion variable, Out- bound Open Innovation. Hypothesis H4b hypothesized a positive relationship between Managerial Ties with Government Officials and Out-bound Open Innovation. The findings of

> **this study** show **that** this **hypothesis** is **not supported.** Therefore, **it can be** concluded **that** **14**

ties of managers of the surveyed organizations with Government Officials did not facilitate Out-bound Open Innovation. Hypothesis H5b hypothesized a positive relationship between

> **Managerial Ties with Managers (at other firms)** **9**

and Out-bound Open Innovation. The findings of

> **this study** show **that** this **hypothesis** is **not supported** either. Therefore, **it can be** concluded **that** **14**

ties of managers of the surveyed organizations with the managers of other firms did not facilitate Out-bound Open Innovation. Hypothesis H6b hypothesized a positive relationship between Managerial Ties with Universities and/or other Research Centers and Out-bound Open Innovation. The findings of this study show that this hypothesis is not supported. However, a statistically significant and negative relationship – not a relationship that was hypothesized in this study – was found between Managerial Ties with Universities and/or other Research Centers and Out-bound Open Innovation. Of the three hypothesized relationships between the dimensions of Managerial Ties and Out- bound Open Innovation, only one with Managerial Ties with Universities and/or other Research Centers was found to be significant, but negative (significant unstandardized coefficient = -.135, p<.01).Therefore ties of managers of the surveyed organizations with Universities and/or other Research Centers were found to stifle facilitation of Out-bound Open Innovation.

These findings are somewhat difficult to explain. No previous research seems to have looked at the relationship between Managerial Ties and Out-bound Open Innovation. It seems that for the facilitation of Out-bound Open Innovation, factors other than Managerial Ties are influential. This study however shows that Managerial

**Ties with Universities and/** or **other Research Centers** 24

relate negatively to Out-bound Open Innovation. This means such Managerial

**Ties with Universities and/** or **other Research Centers** 24

are not beneficial for Out-bound Open Innovation; rather such ties can prove counter-productive. This finding makes sense as Out-bound Open Innovation implies that firms can search for external players that have better fitting business models to exploit and commercialize a particular technology than just depend on internal paths to market (Vanhaverbeke, 2006). In the case of Out-bound Open Innovation, firms aim at

**purposive outflows of knowledge and technology** 4

exploitation, intending

**to leverage existing technological capabilities outside the boundaries of the organization.** 4

Universities, in particular, do not buy technology or other goods from businesses so as to process and later sell them competitively. Instead, the organizational environment, goals, structures and values (Boyne, 2002) of universities and research centers focus on cultivating research talents and conducting academic research (Leydesdorff, 2012). Due to this, pursuing Managerial Ties with Universities and/or other Research Centers may not be a wise thing to do for firms intending to facilitate the Out- bound dimension of Open Innovation. In addition, the

**findings of this study** show that **a positive relationship between** 28

**Managerial Ties with Managers (at other firms)** 9

and Out-bound Open Innovation does not exist among the surveyed firms. This could be due to the fear of losing intellectual property, preventing managers from interacting with their peers outside the firm. Existance of such a positive relationship between Managerial Ties with Managers (at other firms) could be thought of as crucial for Out-bound Open Innovation, as it could be an avenue for potential to market a firm's internal technology and knowledge. Thus, strengethening the intellectual property rights within the country, which is a policy issue, could possibly lead to

**Managerial Ties with Managers (at other firms)** contributing positively **to** 61

Out-bound Open Innovation. This issue, however, merits further investigation before concrete suggestions are made. 5.2.5 Organizational Culture and In-bound Open Innovation Culture is known to

**support innovation by creating an organizational climate** that **institutionalizes innovation as an important activity.** 262

By focusing attention on

> **innovation, a supportive culture helps to motivate and sustain the complex, interactive process of social exchange necessary for successful innovation (Russell, 1989).** 74

In this study two (2) hypotheses related to

> **the relationships between the two** types **of** the predictor variable, **Organizational Culture and** one dimension of **the** 124

criterion variable, In-bound Open Innovation. To recall, In-bound or

> **Outside-in Open Innovation** refers to **the** use **of** 197

discoveries that others make and involves

> **opening up to and** establishing **relationships with external** firms **with the** aim **to access their** 64

competencies

> **in order to** enhance **the firm's innovation performance.** 230

Hypothesis H7a

> **hypothesized a positive relationship between** Highly Integrative Culture **and** In-bound **Open Innovation.** 37

The findings of

> **this study** show **that** this **hypothesis** is **supported.** Therefore, **it can be** concluded **that** 14

Highly Integrative Culture in the surveyed organizations facilitated In-bound Open Innovation. Hypothesis H8a hypothesized a negative relationship between Hierarchy Culture and In-bound Open Innovation. The findings of this study show that this hypothesis is supported as well. Therefore, it can be concluded that Hierarchy Culture in the surveyed organizations did not facilitate In-bound Open Innovation. In fact, presence of Hierarchy Culture in the surveyed firms negatively impacted facilitation of In-bound Open Innovation. Of the two hypothesized

> **relationships between the two** types **of Organizational Culture and** 124

In-bound Open Innovation, the impact of Highly Integrative Culture on In-bound Open Innovation was found to be significant and positive (significant unstandardized coefficient = .546, $p<.01$) while the impact of Hierarchy Culture on In-bound Open Innovation was also found to be significant but negative (significant

unstandardized coefficient = -.252, p<.01). Culture has oft been cited as a major challenge when adopting Open Innovation (Huston & Sakkab, 2006; Verbano, Crema, & Venturini, 2011). Many empirical studies provide

**evidence of a significant relation between** Organizational **Culture and innovation** (e.g. **Chang & Lee, 2007;** 276

Mavondo & Farrell, 2003; Miron, Erez, & Naveh, 2004; Naranjo- Valencia et al., 2011). This empirical evidence however is related to innovation in the Closed Innovation paradigm. This current study investigated

**the link between** Organizational **Culture and** innovation **in the** Open **Innovation** 380

paradigm. Due to the nascency of the concept of Open Innovation (Maria et al., 2009), there are no empirical studies that can be directly related to the findings of this study. However, authors have pointed towards the significance of Organizational Culture in the Open Innovation paradigm (e.g. Golightly et al., 2012). The above results - linking Organizational Culture to In-bound Open Innovation so clearly for the first time in any research setting - help in understanding an important aspect of Open Innovation cited by Herzog (2011); West and Gallagher (2004), among others, as an important future research direction and called the culture of Open Innovation. Golightly et al. (2012) remark that “the optimum `balance' of open and closed innovation for a large corporation will be found through fostering a culture and attitude where `Open Innovation' is always actively considered as an option for new knowledge, and the onus is on those who wish to remain closed to make their case”. The current study shows that the type of Organizational Culture to be fostered that will facilitate In-bound Open Innovation is Highly Integrative Culture. The findings are consistent with the ten essential elements of Open Innovation culture – focused on dimensions that form internal integration and external adaptation – as outlined by Lindegaard (2010) in his book. The finding also concurs with the work of Bell and Laurent (2012). Furthermore, the findings are consistent with Procter & Gamble’s experience of adopting Open Innovation that involved a radical shift from an inward-looking Organizational Culture to a culture that was inward- as well as outward-looking. Such a shift to an integrative culture was vital in order to access the external resources and involved change in the Organizational Culture in Procter & Gamble to

**encourage and facilitate searching outside of the company for innovations** 60

(Dodgson, Gann, & Salter, 2006). In their now famous case study of Procter & Gamble, Dodgson et al. (2006) show how the company - after it

**launched a new strategy** called Organization 2005 **to** fuel **growth through innovation** 60

- had to prepare itself to

**bring in ideas from outside sources, including using the entrepreneurial advantages of small firms,** 60

**in contrast to its past autarkic approach and high-level supervision culture for new product development.** 60

In order to embark on the Open Innovation paradigm, it had to focus

> **on both internal integration and external adaptation** and **in** 2

the process experience a shift in its Organizational Culture. These findings - that is, Highly Integrative Culture impacting In-bound Open Innovation strongly and positively while Hierarchy Culture having a strong negative impact on In- bound Open Innovation - seem to be quite logical. Witzeman et al. (2006) state that the

> **more external innovation is sourced by** a **firm, the more systems, processes, values and culture also** need **to be transformed. The** 15

firms these authors surveyed resisted Open Innovation implementation due to the

> **Not Invented Here syndrome (Katz & Allen, 1982).** Open innovation **on the other hand** 289

demands a shift from the Not Invented Here syndrome - a common barrier to its adoption (Golightly et al., 2012) - to the Invented Anywhere approach.

> **Creating a culture that values outside competence and know-how is crucial for open innovation practice** 41

(Gassmann et al., 2010). For a firm to make this shift in their approach, Organizational Culture plays a critical role as it is

> **a critical means for firms to integrate internal processes and to** adopt **to** the **external** environment **(Denison & Mishra, 1995). The** 2

firms with integrative cultures have widely shared and strongly held values that address the

> **firm's** needs **of internal** integration **and external** adaptation. **On the** 24

contrary, firms with Hierarchy Culture lay a low level of emphasis on these values (Cameron & Freeman, 1991). In view of this, Highly Integrative Culture of the firms facilitates In-bound Open Innovation as In-bound Open Innovation involves interaction of the firms with their environment. At the same time, Hierarchy Culture in firms impedes In-bound Open Innovation because such a culture focuses least on internal integration and external adaptation, emphasis on which

> **is critical for the success of** In-bound **Open Innovation.** 29

> **This finding of the** current **study is consistent with the** 28

view that traditional cultures, which are more inward-looking like the Hierarchy Culture, are often seen as a barrier for a more open approach that Open Innovation involves (Golightly et al., 2012). In addition, another possible reason for Highly Integrative Culture and Hierarchy Culture to positively and negatively,

respectively, impact In-bound Open Innovation could be that

> **values that enhance the organization's capacity for internal integration and external adaptation** can **be useful for the firm in contexts undergoing restructuring and facing major changes** 2

(Tsui et al., 2006). In fact, innovation by definition deals with uncertain problems (Dasanayaka, 2009). King (1990) highlights that though not all organizational change involves innovation, all organizational innovation involves change. Embarking thus on the Open Innovation journey involves problems of setting up structures for Open Innovation and making changes (Maria et al., 2009); and since firms may not be used to evaluate external innovation, managing such external innovations may involve many challenges (Fetterhoff & Voelkel, 2006). A Highly Integrative Culture, based on values focusing internal integration and external adaptation, can clearly help in tackling such challenges and facilitate In-bound Open Innovation. In addition, somewhat consistent with Gordon (1985) who found that

> **better performing** firms **in dynamic or fast-changing industries (high-tech manufacturers) scored high on** 153

external adaptability, the above findings show that a high score on external adaptation (and internal integration) facilitates In-bound Open Innovation. 5.2.6 Organizational Culture and Out-bound Open Innovation Two (2) hypotheses of this study related to the

> **relationships between the two** types **of** the predictor variable, **Organizational Culture and** one dimension of **the** 124

criterion variable, Out- bound Open Innovation. To recall, out-bound dimension implies that firms can search for external players that have better fitting business models to exploit and commercialize a particular technology than just depend on internal paths to market (Vanhaverbeke, 2006). Hypothesis H7b

> **hypothesized a positive relationship between** Highly Integrative Culture **and** Out-bound **Open Innovation.** 37

The findings of

> **this study** show **that** this **hypothesis** is **not supported.** Therefore, **it can be** concluded **that** 14

Highly Integrative Culture in the surveyed organizations did not facilitate Out-bound Open Innovation. Hypothesis H8b hypothesized a negative relationship between Hierarchy Culture and Out-bound Open Innovation. The findings of

> **this study** show **that** this **hypothesis** is **not supported** either. Therefore, **it can be** concluded **that** 14

Hierarchy Culture in organizations did not stifle Out-bound Open Innovation. The findings of this study, indicating no support for the above two hypotheses are interesting in that when compared to similar findings with respect to In-bound Open Innovation, it emerges that for firms to use

> **discoveries of others and** open **up to and** establish **relationships with**

external 64

firms, Highly Integrative Culture and Hierarchy Culture have positive and negative impact respectively. On the other hand, when firms have the resources and technologies and they want to sell them for lack of a fit with the firms' existing business model (Lichtenthaler, 2010b), the Organizational Culture types studied in this study do not have a role to play in Out-bound Open Innovation. This finding shows that firms may not need to worry about having either Highly Integrative Culture or Hierarchy Culture to be successful in Out-bound Open Innovation. It must however be noted that it is rare to find firms that pursue Out-bound Open Innovation and not In-bound Open Innovation. Therefore while firms may make efforts to inculcate Highly Integrative Culture and avoid Hierarchy Culture to be successful in In-bound Open Innovation, presence of any of these types of Organizational Cultures may be a default, but not impactive, in the case of Out-bound Open Innovation. 5.2.7 Moderating effect of Regimes of Appropriability between predictor variables and Open Innovation A. Regimes of Appropriability as moderator between Organizational Citizenship Behaviours and Open Innovation Two (2) hypotheses of this study related to the moderating role of Regimes of Appropriability on the

relationships between the three dimensions of Organizational Citizenship Behaviours and two dimensions of Open Innovation. 126

It was hypothesized that Regimes of Appropriability moderates the relationships that exist between Altruism, Conscientiousness and Sportsmanship, and In-bound Open Innovation. Similar moderating effect of Regimes of Appropriability was hypothesized to exist on the relationships of Altruism, Conscientiousness and Sportsmanship with Out-bound Open Innovation. The

findings of this study indicate that the moderating role of 45

Regimes of Appropriability is non-existent with respect to all the relations between the dimensions of the

predictor variable and the dimensions of the criterion variable, except in the case of the 65

relationship between Sportsmanship and In-bound Open Innovation. Therefore weak statistical proof exists

in this study to prove that the relationship between Organizational Citizenship Behaviours and Open Innovation 354

is moderated by Regimes of Appropriability. At best, based on one significant moderating effect, it can be concluded

that Hypothesis H9a is partially supported while Hypothesis H9b is not supported. 222

B. Regimes of Appropriability as moderator between Managerial Ties and Open Innovation Two (2) hypotheses of this study related to the moderating role of Regimes of Appropriability on the relationships between the three dimensions of Managerial Ties and two dimensions of Open Innovation. It was hypothesized that Regimes of Appropriability moderates the relationships that exist between Managerial Ties with Managers, Managerial Ties with Universities and/or other Research Centers and Managerial Ties with Government Officials, and In-bound Open Innovation. Similar moderating effect of Regimes of Appropriability was hypothesized to exist on the relationships of Altruism, Conscientiousness and Sportsmanship with Out-bound Open Innovation.

**The findings of this study indicate that the** moderating role **of** 45

Regimes of Appropriability is non-existent with respect to all these relations between the dimensions of the predictor variable and both the dimensions of the criterion variable. Therefore it is concluded that no statistical proof exists to prove

**that the relationship between** Managerial Ties and **Open Innovation is** moderated **by** 208

Regimes of Appropriability. As a result, Hypotheses H10a and H10b are not supported. C. Regimes of Appropriability as moderator between Organizational Culture and Open Innovation The last two (2) hypotheses of this study related to the moderating role of Regimes of Appropriability on the

**relationships between the two types of** Organizational Culture **and two dimensions of** 306

Open Innovation. It was hypothesized that Regimes of Appropriability moderates the relationships that exist between Highly Integrative Culture and Hierarchy Culture, and In-bound Open Innovation. Similar moderating effect of Regimes of Appropriability was hypothesized to exist on the relationships of Highly Integrative Culture and Hierarchy Culture with Out-bound Open Innovation. The

**findings of this study indicate that the** moderating role **of** 45

Regimes of Appropriability is non-existent with respect to all these relations between the types of the predictor variable and both the dimensions of the criterion variable. Therefore weak statistical proof emerged in this study to prove

**that the relationship between Organizational Culture and** Open Innovation **is** 100

moderated by Regimes of Appropriability. Hypotheses H11a and H11b are thus not supported. The Open Innovation paradigm assumes that

**a multitude of ideas** exist **outside the firm and that the** firms **should** 15

actively buy and sell Intellectual Property (Maria et al., 2009). Therefore,

**firms using Open Innovation need to deal with the need to protect** their **intellectual capital (Henkel, 2006).** 15

No previous

**study, to the best knowledge of the researcher,** 27

examines the

**moderating role of Regimes** of Appropriability **on the relationship between**

dimensions of **Open Innovation** 1

and the predictor

**variables of interest in this study.** Due to this **the** findings **of** 191

this study cannot be directly related to any past literature. However, in the larger context of Open Innovation, Hurmelinna et al. (2007) state that, depending upon the situation of the organization, the strength of Regimes of Appropriability may be useful as well as harmful. The authors show that in most cases involving

**whether to be protective or to exploit new knowledge** 15

externally, moderate Regimes of Appropriability may

**be the most effective strategy,** providing **the** firm **with more control and various alternatives to react proactively to emerging opportunities. The** 138

above findings

**of the current study** with respect **to the** moderating **role of** 403

Regimes of Appropriability between all the predictor variables and dimensions of Open Innovation are neither expected nor surprising. While moderation of Regimes of Appropriability

**on the relationships between the predictor variables and** 101

dimensions of Open Innovation has hardly been tested before,

**according to the conventional view, strong appropriability regimes** 1

– i.e.

**when the firm that creates innovation is the main beneficiary of the innovation** 1

–

**create increased willingness among innovators to offer internal innovations for others to use thereby enhancing Open Innovation outcomes (Chesbrough,** 2003a). **However,** 1

the findings of this study provide no evidence to this effect. At the same time, this study's findings may be broadly - and perhaps wrongly 10 - considered to be inconsistent with Hurmelinna et al. (2007) and (Laursen & Salter, 2005) who found

**that Open Innovation provides better results in moderate Regimes** 1

of Appropriability. The findings also seem to be in contrast with

**Fabrizio (2005)** who **reported negative relationship between high** Regimes of **Appropriability and aspects of Open Innovation.** 1

It should however be noted again that the above-cited studies looked at whether different Regimes of Appropriability favoured or hindered Open Innovation and did not test the

**moderating role of Regimes** of Appropriability **on the relationship between** the predictor variables **and** dimensions of **Open Innovation.** 1

This study shows that Regimes of Appropriability did not matter in the case of Malaysian high-tech sector as far as the relations between the predictor variables of interest in this study and dimensions of Open Innovation are concerned. 5.3 Theoretical and Managerial Implications This research, focusing on Open Innovation practices in Malaysian high-tech sector, has

**theoretical and managerial implications.** These **are discussed below.** 5.3.1 **Theoretical Implications** 54

This

**study has** several **theoretical implications. First,** this **study contributes to** academic research **by** 362

providing empirical evidence regarding Open Innovation and factors affecting Open Innovation in Malaysia. The findings make

**an important contribution to the body of knowledge** 7

highlighting how several organizational variables operate in the Open 10 It may be wrong to relate the findings of other studies with those of this study because most studies examine the direct effect of Regimes of Appropriability on Open Innovation, while this study aimed at

**investigating the moderating** (indirect) **role of** Regimes of Appropriability **on the relationship between** the predictor variables **and** dimensions **of** 290

Open Innovation. Innovation paradigm. To the best

**knowledge of** this **researcher, this is the first empirical** 27

study which attempted to establish the link between Open Innovation and Organizational Citizenship Behaviours, Organizational Culture, and Managerial Ties. Thus answering the research questions of this study fills up important research gaps in Open Innovation literature. The context of this study makes it even more important. According to West et al. (2006b), Open Innovation is practiced within the context of a given

set of political and economic institutions, including regulations, intellectual property law, capital markets and industry structure. However

| | |
|---|---|
| most of the prior research on Open Innovation has focused on | 371 |

the U.S system which makes an examination of Open Innovation in other contexts important to clearly identify the prerequisites for and limits of Open Innovation. This research contributes by making a step forward in filling this gap and helping understand the prerequisites for and limits to Open Innovation in the Malaysian context. Malaysia is a developing Asian country and this study's findings,

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|---|---|
| in contrast to the findings of most Open Innovation studies emerging from the | 376 |

western context, add

| | |
|---|---|
| to the body of knowledge by providing evidence | 99 |

concerning Open Innovation in the Asian context and widen scope of the Open Innovation debate with new evidence from Asia. With respect to the unique cultural context of Malaysia, this study brings a significant value to Open Innovation literature in developing economies. Second, this study is the first to create a framework that puts together several organizational variables which explain facilitation of Open Innovation. Theoretically the study contributes by highlighting what types of Organizational Culture, what types

| | |
|---|---|
| of Managerial Ties and which Organizational Citizenship Behaviours affect Open Innovation positively and | 1 |

negatively. In addition this study looks at both the dimensions of Open Innovation, In- bound and Out-bound, to understand how these aspects of Open Innovation are affected by the organizational variables of interest. Given that the organizational variables in question explain quite a lot of variance in Open Innovation, this study presents a model that can help in fostering Open Innovation not only in Malaysia and other developing countries but also in the developed countries. This is because some of the unique findings of this study can also be extended to the developed countries' contexts for creating better Open Innovation climate. While this model helps explain how the organizational variables affect In-bound Open Innovation, it is also

| | |
|---|---|
| important in light of an increasing interest of academics and managers to understand fundamental enablers and barriers to the successful commercialization of technologies outside a firm's boundaries | 122 |

i.e. Out-bound Open Innovation (Lichtenthaler, 2010a). In this study Organizational Citizenship Behaviours emerges as an important predictor of In-bound and Out-bound Open Innovation. These findings set a base for future scholars to explore this relationship in detail in different developing and developed countries to add to the generalizability of these findings. These findings are also an important extension in the theory of Open Innovation and to the literature of Organizational Citizenship Behaviours. These findings

| | |
|---|---|
| play an important role in emergence of a new | 464 |

sub- area of future research which is Organizational Citizenship Behaviours and Open Innovation enablers. Third, the findings of Organizational Culture and Open Innovation are also a major contribution in theory and literature related to both these constructs. This study made an advance by suggesting Highly Integrative

Culture as a major predictor of In-bound Open Innovation while this type of culture is not suggested as a significant predictor of Out- bound

> **Open Innovation. On the other hand,** this study could **not** establish any of **the** 29

culture types studied as a predictor of Out-bound Open Innovation. Due to this, an important area for future research is highlighted: what culture type(s) or factors significantly influence Out-bound Open Innovation. Moreover, Hierarchy Culture

> **was found to be negatively related to** In-bound Open **Innovation** 126

but no significant effect was recorded for Out-bound Open Innovation. This inconsistency in results highlights the importance of unique cultural factors in Malaysia. These findings are a valuable addition to the literature related to culture and Open Innovation providing ample room for

> **future research in** the **area.** Fourth, **the results of** this **study** 216

related to Managerial Ties and Open Innovation bring key insights for the scholars in the field of Open Innovation. The results also contribute to the Open Innovation theory by highlighting the ties that affect Open Innovation positively and negatively (West et al., 2006b). Traditionally and logically all the ties are expected to be positively related with Open Innovation. This general notion – highlighted by many past studies (cf. Huston & Sakkab, 2006; Qin & Shanxing, 2010) – was confirmed for industry- academia relationship and industry-government relationships in this study, however, surprisingly ties of managers with managers at other firms was not found to be significant. On the other hand, Managerial Ties had no significant effect on Out-bound Open Innovation. This finding contributes to the Open Innovation theory and fills a void in the literature as highlighted by West et al. (2006b) while at the same time provides a base to investigate the potential mediators between these relationships to clarify the important theoretical link. Fifth, in addition to unraveling the role of the predictor variables of this study in Open Innovation facilitation, this study also shows that Regimes of Appropriability largely do not have any significant role in altering the relationships of Open Innovation with Organizational Citizenship Behaviours, Managerial Ties and Organizational Culture. In other words, this study adds a new dimension to our

> **understanding of the role of Regimes of Appropriability** 80

viz-a-viz Open Innovation. The current literature contains several contradictions with respect to the role of Regimes of Appropriability in Open Innovation (e.g. Chesbrough, 2003a; Fabrizio, 2006; Laursen & Salter, 2005). This study contributes to the theory by removing the contradictions to some extent, at least

> **in the context of a developing country** like Malaysia. While **this** 217

study does not look at the direct relationship of Regimes of Appropriability with Open Innovation, it does make an important theoretical contribution by showing that Regimes of Appropriability have largely no role in the relation between Open Innovation and the predictor variables studied in this study. 5.3.2 Managerial Implications

> **In addition to** the theoretical **implications** stated **above, this study** has several **managerial implications** 352

which are highlighted below: First, the

**results of this study showed that** both the dimensions **of** 463

Open Innovation (In- bound and Out-bound) are significantly determined by all the dimensions of Organizational Citizenship Behaviours. This finding suggests that Organizational Citizenship Behaviours are important factors for the facilitation of Open Innovation. The examples of pioneering firms like Procter & Gamble

**indicate that a** firm's **strategic planning activities play a critical role in developing a successful technology licensing program (Chesbrough, 2007).** 21

Therefore, managers should pay attention to increasing employees' Organizational Citizenship Behaviours in order to facilitate both Inbound- and Out-bound Open Innovation. Managers can also design training programs to incorporate scope for Organizational Citizenship Behaviours in such programs to ensure facilitation of Open Innovation in their organizations. While the In-bound Open Innovation dimension can be facilitated by performing Organizational Citizenship Behaviours, managers should particularly take note of the Out-bound Open Innovation and tap Organizational Citizenship Behaviours of employees to facilitate this dimensions as well. This study recommends practitioners to consider Organizational Citizenship Behaviours as

**one of the major** predictors **of Open Innovation.** Along with all **the** 384

structural, group, policy and cultural interventions to promote Open Innovation, managers should also focus at the individual- level to establish mechanism which can promote Organizational Citizenship Behaviours among the employees. Specifically the promotion of Organizational Citizenship Behaviours can be established through different initiatives at the workplace, such as: 1. Rewarding and recognizing the employees who exhibit Organizational Citizenship Behaviours at the workplace. 2. Linking Organizational Citizenship Behaviours with performance management system and performance appraisals. 3. Motivational and mindset building trainings should be provided to the employees to encourage display of Organizational Citizenship Behaviours. 4. Top management/leaders should exhibit their strong commitment to and appreciate Organizational Citizenship Behaviours at the workplace, and 5. Organizational Citizenship Behaviours should be linked and incorporated into organizational norms and values. Lichtenthaler (2010b) mentions that firms which do not recognise the importance of Out- bound Open Innovation are in danger of missing opportunities and that

**an integrated approach to strategic technology planning will most likely gain importance in the future because firms will actively license technology.** 21

Hence, such technology licensing (i.e. Out- bound Open Innovation) –

**which will not merely be an option but a necessity to keep up with competition** 21

(Lichtenthaler, 2010b) – can be facilitated by employees who perform Organizational Citizenship Behaviours. The recommendations made above can help managers in fostering Organizational Citizenship Behaviours at the workplace and in turn help in facilitating Open Innovation in organizations.

**Second, the results of this study also** show **that** 450

Highly Integrative Culture significantly facilitates In-bound Open Innovation. This is an important finding in that managers can veer their organizations towards Highly Integrative Culture in order to facilitate In-bound Open Innovation. These findings bring deep insights for managers and practitioners striving to promote Open Innovation at the workplace. Based on the knowledge of their Organizational Culture, managers can even predict whether In-bound Open Innovation will be successful in their organizations in the present culture. Besides, this study found that Hierarchy Culture related negatively to In-bound Open Innovation and thus managers should endeavor to avoid this Organizational Culture type. Cultural issues have often been identified as key barriers to implementation of Open Innovation in the literature (Bigliardi, Dormio, & Galati, 2012; Chesbrough & Crowther, 2006). This study's findings will help overcome this barrier as the managers can focus on Highly Integrative Culture and avoid Hierarchy Culture to facilitate In-bound Open Innovation in their organizations. Since the main motives for firms to engage in In-bound Open Innovation are growth and revenue (Chesbrough & Crowther, 2006), Highly Integrative Culture can help a firm improve growth and revenue through In-bound Open Innovation This study recommends promotion and establishment of Highly Integrative Culture in the organization where free flow of ideas and initiatives is possible horizontally as well as vertically. The top managers concerned for promoting Open Innovation at the workplace should discourage all the aspects of Hierarchy Culture and show strong commitment towards promotion of Highly Integrative Culture in the organization. Another issue highlighted in the findings is relevant to Out-bound Open Innovation. No significant association was found between Out-bound Open Innovation and either type of culture studied in this research. This indicates that there may be certain mediators of these relationship or some other form of culture may be suitable for promotion of Out-bound Open Innovation at the workplace. These findings highlight the sensitivity of handling complex cultural construct at workplace towards which managers and practitioners should be more vigilant. Future research in this area may help managers identify the type of culture which can help foster Out-bound Open Innovation at the workplace. The study's finding are useful for managers in terms of generating cultural consciousness and stressing upon the importance of local context while using interventions to achieve strategic goals such as establishing Open Innovation climate in the organizations. Third, this study also found that for a firm's managers to have ties with government officials and scholars in universities and other research centers can facilitate In-bound Open Innovation. It is thus recommended that firms should encourage their managers to cultivate such ties in order to have their In-bound Open Innovation projects facilitated. Numerous studies show the importance of university-industry collaboration. This collaboration can be enhanced by the ties of managers with university and research centers. So an open culture which encourages managers' networking with universities and government institutions may help organizations foster In-bound Open Innovation at the workplace. At the same time, this study surprisingly revealed that managerial ties of a firm with managers at other firms may not be worth pursuing as such ties were not found to have any significant effect on either dimension of Open Innovation. Similar insignificant relationships were found between managerial ties with government officials and Out-bound Open Innovation; and managerial ties with universities and research centers and Out-bound Open Innovation. This finding brings key insight for Malaysian organizations that the inter-organizational ties may not be fruitful for Open Innovation. Therefore, it is recommended that the practitioners avoid investing in such relations as doing so may only be a waste of time, money and other organizational resources. This study at the same time recommends Malaysian managers/scholars to delve deeper into this issue and investigate the reasons due to which managerial ties between organizations do not predict Open Innovation in Malaysian organizations. The second part of these findings relates to the insignificant results for all types of Managerial Ties with Out-bound Open Innovation. This seems to be due to the Malaysian culture which does not appear to support the association between Managerial Ties and Out- bound Open Innovation. As no association is found between these two constructs, one may be tempted to suggest that managers should not encourage Managerial Ties in order to facilitate Open Innovation. However, it must be noted that this finding might also be construed as pointing towards the presence of possible mediators between Managerial Ties and dimension of Open Innovation. Therefore it is recommended that managers and scholars working in Malaysia should focus more on identifying such possible mediators (which could possibly be culture related). A deeper analysis can be helpful in identifying the unique attributes which currently are playing the key role to buffer the influence of Managerial Ties on Out-bound Open Innovation. Fourth, this study with strong theoretical support hypothesized Regimes of Appropriability

**as a moderator of relationships between** predictor **variables** in this study **and** dimensions **of** **351**

Open Innovation. The study revealed no support for this association. Therefore, it is recommended that the managers should focus on the predictor variables of this study and their influence or lack of it on Open Innovation. The managers do not need to worry about whether Regimes of Appropriability will affect any of the direct relationships as no moderating role in general was established in this study. This study recommends that since Regimes of Appropriability was not found to be a moderator, the managers and scholars should be attentive to other environmental moderators which may help or hinder the relationships between the predictor variables of this study and dimensions of Open Innovation. 5.4 Research Limitation While this study makes several important theoretical and managerial contributions, it has some limitations. First, this study restricted analysis to a specific sector and surveyed only the high-tech sector in Malaysia. Therefore the findings of this study may not be completely relevant and generalisable to other sectors like the medium- and low-tech. However, the high-tech sector only was chosen in this study because the industries in this sector are primarily knowledge-driven industries (Hatzichronoglou, 1997), and since Open Innovation is rather a new concept, more so in the Asian context, the adoption of Open Innovation is expected to be higher among high-tech industries than in asset-intensive mature industries. Second, both the dimensions of Open Innovation were measured using non-standard measures. This is however justified as the measures used are the only measures developed for Open Innovation. Given the recency of Open Innovation research, no standard and widely-used scale exists for this construct. However the scale used in this study captured the essence of Open Innovation and was developed pursuant to generating a pool of items after reviewing the related literature on Open Innovation and then presenting those items to industry managers to ensure proper capture of Open Innovation (Sisodiya, 2008). Besides, since validity and reliability of the scale stand established by the researcher (Sisodiya, 2008), using the measures seems to be proper in this study. Third, this study used cross-sectional sample to collect data. Use of cross-sectional data may be problematic as such data may be mismatched with the research questions that implicitly or explicitly deal with causality or change, which can be measured properly by measuring the relevant variables more than once (Bono & McNamara, 2011). In Open Innovation research, however, many previous studies (e.g. Parida, Westerberg, & Frishammar, 2012; Salmi, 2012; Valentina, Raffaella, & Luisa, 2010) have used cross- sectional data and thus use of such data in this study can be considered proper. 5.5 Future Research Research into Open Innovation practices of organizations is a fruitful avenue. First, the framework developed in this study can be empirically tested in other sectors, for example, in medium- and low-tech sectors. Future research can look at whether the effects of the predictor variables of

**this study on the** two **dimensions of Open Innovation** **411**

vary from sector to sector or remain the same across sectors. Second, this study surveyed the manufacturing sector only. Empirical research, testing the framework of this study, can be conducted in the services sector as well. This can lead to interesting research as research into Open Innovation in service industry is not only a new area of research but an under- explored area also (Chesbrough, 2011). Third, the framework of this study can be tested in different country settings. This can

**add to** the **understanding of** whether **the effects of the** predictor variables **on** **169**

the dimensions of the criterion variable of this study are related to the country context. The research framework developed in this study can be applied in other countries, particularly developing ones like Indonesia, Thailand, India, China etcetera so that its applicability is tested across different cross-cultural contexts. Fourth, as mentioned above, this study used cross-sectional sample to collect data. To have a better understanding of Open Innovation practices and issues, future research may consider using longitudinal data to capture causality (Bono & McNamara, 2011). Fifth, pursuant to this study and given that Open Innovation research is in its nascent stage particularly in Asia, this study leaves ample room to test for the mediating and moderating roles of several variables in the relationships proven and not proven in this study. APPENDIX (A) Research Questionnaire APPENDIX (B) Correspondence with scholars Correspondence with Dr. Ulrich Lichtenthaler, Chair-holder of

**Management and Organization at the University of Mannheim,** **196**

**Germany.**

Correspondence with Assoc. Prof. Dr. Mattia Bianchi,

**Assistant Professor of Business Administration at the** Stockholm School **of** Economics, **Sweden.** 201

Correspondence with Prof. Dr.

**Rajah Rasiah, Professor of Technology and Innovation Policy, University of Malaya, Malaysia** 270

APPENDIX (C) Data Analysis Output PEARSON CORRELATION Mean SD INOI OUTOI ALT SPO CON MAN RES GOV EMP HAR CUS SOC In-bound Open Innovation (INOI) Out-bound Open Innovation (OUTOI) Altruism (ALT) Sportsmanship (SPO) Conscientiousness (CON) Ties with Managers (MAN) With with Universities & Research Centers (RES) Ties with Govt. Officials (GOV)

**Employee Development** (EMP) **Harmony** (HAR) **Customer Orientation** (CUS) **Social Responsibility** (SOC) **Innovation** 2

(INN) **.

**Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). 4.** 164

27 .61 4.17 .75 5.42 .74 4.39 1.46 5.35 .74 4.29 .61 4.33 .60 4.21 .52 4.18 .72 4.27 .67 4.97 1.30 4.82 1.23 4.96 1.17 .162 ** .008 .294 ** .397 ** .226 ** -.035 -.039 .284 ** .309 ** .036 .200 ** -.040 .042 .077 .020 .467 ** -.070 -.136 * .282 ** -.036 .312 ** .525 ** .031 -.073 .354 ** -.023 .347 ** .536 ** .631 ** .139 * -.017 .311 ** -.055 .165 ** .275 ** .431 ** .637 ** .178 ** -.014 .402 ** .010 .200 ** .302 ** .448 ** .608 ** .520 ** .300 ** .123 * .259 ** .096 .100 .218 ** .321 ** .420 ** .522 ** .492 ** .101 -.079 .222 ** .041 .212 ** .317 ** .351 ** .398 ** .492 ** .376 ** .627 ** .082 -.022 .253 ** .019 .125 * .322 ** .431 ** .559 ** .493 ** .365 ** .378 ** CLUSTER ANALYSIS 4-CLUSTER SOLUTION

**Initial Cluster Centers Cluster 1 2 3 4** 40

OC.EMPDEV 4.75 2.75 5.00 4.50 OC.HARM 2.50 5.00 5.00 4.75 OC.CUSTORI 4.25 4.25 5.00 3.75 OC.SOCRES 2.33 4.67 2.33 5.00 OC.INNOV 4.75 2.00 3.00 5.00

**Iteration History** a **Iteration Change in Cluster Centers 1 2 3 4** 1 **1.** 268

921 1.626 1.422 .984 2 .356 .485 .486 .243 3 .063 .246 .178 .158 4 .040 .133 .049 .074 5 .065 .122 .000 .061 6 .067 .050 .000 .026 7 .052 .027 .000 .008 8 .100 .038 .000 .000 9 .048 .017 .000 .000 10 .000

**.000 .000 .000 a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is** 10. **The minimum distance between initial centers is 3.** 152. **Cluster Membership Case Number** 25

ID Cluster Distance 1 27 1 .346 2 31 1 .949 3 32 1 2.109 4 33 1 1.807 5 39 1 1.457 6 43 1 .337 7 45 1 1.062 8 59 1 1.358 9 77 1 1.305 10 79 1 .612 11 89 1 .648 12 91 1 .541 13 92 1 .697 14 94 1 .953 15 95 1 .433 16 100 3 1.174 17 109 1 .413 18 110 1 .934 19 113 1 .711 20 115 1 1.305 21 117 3 1.195 22 120 1 .851 23 124 1 .791 24 126 1 .819 25 149 1 2.211 26 177 1 1.106 27 178 1 1.507 28 181 1 .554 29 183 1 .517 30 184 1 .637 31 185 1 .945 32 186 1 1.041 33 194 1 1.150 34 196 1 1.355 35 197 1 1.127 36 198 1 1.188 37 200 1 .801 38 201 1 .785 39 202 3 1.067 40 203 1 .709 41 204 1 1.251 42 205 1 1.200 43 206 1 .794 44 207 1 .616 45 209 1 .707 46 210 1 .851 47 211 1 .843 48 246 3 1.680 49 247 3 1.608 Cluster Membership Case Number ID Cluster Distance 50 254 3 1.044 51 268 3 1.849 52 1 2 .881 53 2 2 .898 54 3 2 .601 55 4 2 .278 56 5 2 .574 57 6 2 .489 58 7 2 .379 59 8 2 .791 60 9 2 .278 61 10 2 .304 62 11 2 .434 63 12 2 .549 64 13 2 .425 65 14 2 .634 66 15 2 .418 67 16 2 1.061 68 17 2 .580 69 18 2 .590 70 19 2 .869 71 20 2 .707 72 21 2 .807 73 23 2 .743 74 24 2 1.257 75 25 2 1.169 76 28 2 1.224 77 30 2 1.379 78 35 2 .841 79 37 2 .749 80 38 2 1.207 81 40 2 .686 82 41 2 1.297 83 42 2 .873 84 44 2 .643 85 51 2 .964 86 52 2 .948 87 53 2 1.303 88 54 2 1.088 89 55 2 .791 90 56 2 .939 91 61 2 1.297 92 62 2 .473 93 69 2 .831 94 71 2 .807 95 72 2 .496 96 73 2 .920 97 75 2 1.056 98 78 2 .873 Cluster Membership Case Number ID Cluster Distance 99 80 2 .929 100 81 2 .813 101 82 2 .731 102 84 2 1.203 103 85 2 .992 104 86 2 .351 105 87 2 .734 106 88 2 1.238 107 93 2 .864 108 96 2 1.322 109 97 2 .813 110 98 2 .742 111 101 2 1.134 112 102 2 .965 113 103 2 .981 114 104 2 .852 115 107 2 .697 116 108 2 1.204 117 111 2 1.172 118 112 3 .621 119 119 2 .772 120 121 2 .701 121 123 2 .790 122 127 2 1.147 123 129 2 .721 124 132 2 .880 125 133 3 1.082 126 134 2 .664 127 135 2 .278 128 137 2 .727 129 138 2 .869 130 179 2 .484 131 180 2 .359 132 182 2 .797 133 187 2 1.291 134 188 2 .359 135 189 2 .709 136 190 2 .752 137 191 2 .337 138 192 2 1.676 139 193 2 1.202 140 199 2 .427 141 212 2 1.011 142 213 2 .971 143 214 2 .572 144 218 2 .587 145 231 3 1.334 146 234 2 1.212 147 242 2 2.474 Cluster Membership Case Number ID Cluster Distance 148 244 2 1.830 149 245 2 1.907 150 253 3 1.464 151 255 2 1.661 152 256 2 1.511 153 257 2 1.913 154 260 2 1.040 155 265 2 1.135 156 267 2 2.289 157 280 2 1.988 158 290 2 .983 159 291 2 1.319 160 292 2 .853 161 295 2 1.284 162 296 3 .834 163 299 2 .828 164 301 2 .484 165 302 2 .924 166 315 2 1.947 167 325 2 .733 168 327 2 1.172 169 329 2 .552 170 332 2 1.356 171 336 2 .826 172 337 2 1.104 173 338 2 1.012 174 22 4 .432 175 26 4 .718 176 29 4 1.058 177 34 4 .815 178 36 4 .604 179 46 4 1.251 180 47 4 1.005 181 48 4 .996 182 49 4 1.060 183 50 4 1.180 184 57 4 1.127 185 58 4 .825 186 60 4 .767 187 63 4 1.251 188 64 4 .759 189 65 4 .515 190 66 4 .787 191 67 4 .511 192 68 4 .687 193 70 4 .992 194 74 4 .630 195 76 4 .928 196 83 4 .990 Cluster Membership Case Number ID Cluster Distance 197 90 4 .711 198 99 4 .876 199 105 4 .799 200 106 4 .762 201 114 4 .534 202 116 4 1.106 203 118 4 1.192 204 122 4 .644 205 125 4 .563 206 128 4 .576 207 130 4 .716 208 131 4 .801 209 136 4 .938 210 139 4 .775 211 140 4 .845 212 141 4 .648 213 142 4 .815 214 143 4 .648 215 144 3 .925 216 145 4 .445 217 146 4 .499 218 147 4 .659 219 148 4 .595 220 150 4 .877 221 151 4 .347 222 152 4 .787 223 153 4 .607 224 154 4 .579 225 155 4 .499 226 156 4 .470 227 157 4 .632 228 158 4 .499 229 159 4 .607 230 160 4 .770 231 161 4 .755 232 162 4 .543 233 163 4 .872 234 164 4 .757 235 165 4 .751 236 166 4 .886 237 167 4 .659 238 168 4 .687 239 169 4 .660 240 170 4 .472 241 171 4 .755 242 172 4 .626 243 173 4 .712 244 174 4 .610 245 175 4 1.339 Cluster Membership Case Number ID Cluster Distance 246 176 4 .886 247 195 4 .841 248 208 4 1.106 249 215 4 .522 250 216 4 .423 251 217 4 .805 252 219 4 .541 253 220 4 .691 254 221 4 1.080 255 222 4 .699 256 223 4 .446 257 224 3 .757 258 225 3 .880 259 226 4 .487 260 227 4 .609 261 228 4 .595 262 229 4 .452 263 230 3 .938 264 232 4 1.085 265 233 4 1.145 266 235 4 .799 267 236 4 1.390 268 237 4 .902 269 238 4 .369 270 239 4 .723 271 240 4 .864 272 241 4 1.061 273 243 4 .596 274 248 4 1.052 275 249 4 .907 276 250 3 .837 277 251 3 1.093 278 252 4 .547 279 258 4 .799 280 259 4 .452 281 261 4 .499 282 262 4 .413 283 263 4 1.080 284 264 4 .435 285 266 4 1.887 286 269 4 .945 287 270 4 .540 288 271 4 .522 289 272 4 .604 290 273 4 .653 291 274 4 .799 292 275 4 .452 293 276 4 .799 294 277 4 .525 Cluster Membership Case Number ID Cluster Distance 295 278 4 .699 296 279 4 .533 297 281 4 .870 298 282 4 .699 299 283 4 .925 300 284 4 .452 301 285 4 .470 302 286 4 .699 303 287 4 .613 304 288 4 .376 305 289 4 .650 306 293 4 .661 307 294 4 .844 308 297 4 1.421 309 298 4 .611 310 300 3 .978 311 303 4 .699 312 304 4 .749 313 305 4 .714 314 306 4 .567 315 307 4 .956 316 308 4 .645 317 309 4 .870 318 310 4 .580 319 311 4 .799 320 312 4 .522 321 313 4 .659 322 314 4 .799 323 316 4 .483 324 317 4 1.314 325 318 4 .520 326 319 4 .562 327 320 4 .799 328 321 4 .746 329 322 4 .800 330 323 4 .447 331 324 4 .447 332 326 4 .490 333 328 4 .809 334 330 4 .762 335 331 4 .702 336 333 4 .887 337 334 4 .877 338 335 4 1.146 339 339 4 .655

**Final Cluster Centers Cluster 1 2 3 4** 25

OC.EMPDEV 3.47 3.98 4.61 4.71 OC.HARM 3.44 4.04 4.64 4.75 OC.CUSTORI 3.61 4.08 4.33 4.47 OC.SOCRES 3.07 4.22 2.84 4.61 OC.INNOV 3.57 3.86 4.26 4.77

**Distances between Final Cluster Centers Cluster 1 2 3 4 1 1.** 40

504 1.948 2.794 2 1.504 1.699 1.471 3 1.948 1.699 1.849 4 2.794 1.471 1.849

**ANOVA Cluster Error F Sig. Mean Square df Mean Square df** 154

OC.EMPDEV 23.611 3 .164 335 143.590 .000 OC.HARM 24.777 3 .146 335 169.338 .000 OC.CUSTORI 9.508 3 .190 335 50.088 .000 OC.SOCRES 39.241 3 .165 335 237.117 .000 OC.INNOV 27.184 3 .209 335 130.310

**.000 The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal. Number of Cases in each Cluster** 13

1 44.000 2 117.000 Cluster 3 19

**.000 4** 159 **.000 Valid** 339 **.000 Missing .000** 3 **-CLUSTER** 40

SOLUTION Initial Cluster Centers Cluster 1 2 3 OC.EMPDEV 3.25 5.00 4.75 OC.HARM 3.25 5.00 2.50 OC.CUSTORI 4.50 4.00 4.25 OC.SOCRES 5.00 5.00 2.33 OC.INNOV 2.50 5.00 4.75

**Iteration History a Iteration Change in Cluster Centers 1 2 3 1** 40

1.638 .970 1.833 2 .248 .144 .210 3 .140 .055 .117 4 .111 .048 .075 5 .042 .021 .018 6 .046 .032 .000 7 .026 .011 .029 8 .020 .010 .033 9

**.000 .000 .000 a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is** 9. **The minimum distance between initial centers is 3.** 553. **Cluster Membership Case Number** 25

ID Cluster Distance 1 27 3 .555 2 31 3 1.069 3 32 3 2.002 4 33 1 1.983 5 39 3 1.527 6 43 3 .588 7 45 3 .824 8 59 3 1.258 9 77 3 1.274 10 79 3 .673 11 89 3 .659 12 91 3 .427 13 92 3 .696 14 94 3 .750 15 95 3 .651 16 100 3 1.143 Cluster Membership Case Number ID Cluster Distance 17 109 3 .467 18 110 3 .780 19 113 3 .706 20 115 3 1.292 21 117 3 1.239 22 120 3 1.007 23 124 3 1.040 24 126 3 .964 25 149 3 2.098 26 177 3 1.394 27 178 3 1.522 28 181 3 .711 29 183 3 .677 30 184 3 .635 31 185 3 1.031 32 186 3 1.167 33 194 3 1.046 34 196 3 1.545 35 197 3 1.355 36 198 1 1.315 37 200 3 .814 38 201 3 .884 39 202 3 1.146 40 203 3 .545 41 204 1 1.387 42 205 3 1.341 43 206 3 .953 44 207 3 .829 45 209 3 .733 46 210 3 1.007 47 211 3 .732 48 246 3 2.081 49 247 3 2.443 50 254 3 2.290 51 268 3 2.642 52 1 1 .840 53 2 1 .903 54 3 1 .618 55 4 1 .230 56 5 1 .562 57 6 1 .495 58 7 1 .391 59 8 1 .840 60 9 1 .230 61 10 1 .299 62 11 1 .435 63 12 1 .557 64 13 1 .384 65 14 1 .582 Cluster Membership Case Number ID Cluster Distance 66 15 1 .408 67 16 1 1.042 68 17 1 .565 69 18 1 .596 70 19 1 .847 71 20 1 .672 72 21 1 .852 73 23 1

.691 74 24 2 1.312 75 25 1 1.196 76 28 1 1.273 77 30 1 1.342 78 35 1 .900 79 37 1 .736 80 38 1 1.197 81 40 1 .653 82 41 1 1.242 83 42 1 .844 84 44 1 .607 85 51 1 .919 86 52 1 .894 87 53 1 1.261 88 54 2 1.113 89 55 1 .840 90 56 1 .966 91 61 1 1.330 92 62 1 .443 93 69 1 .814 94 71 1 .852 95 72 1 .476 96 73 1 .914 97 75 1 1.051 98 78 1 .871 99 80 1 .920 100 81 1 .821 101 82 1 .735 102 84 1 1.216 103 85 1 .950 104 86 1 .352 105 87 1 .790 106 88 1 1.289 107 93 1 .840 108 96 1 1.302 109 97 1 .776 110 98 1 .787 111 101 1 1.088 112 102 1 .916 113 103 1 .920 114 104 1 .826 Cluster Membership Case Number ID Cluster Distance 115 107 1 .727 116 108 1 1.184 117 111 1 1.196 118 112 1 1.601 119 119 1 .720 120 121 1 .638 121 123 1 .757 122 127 1 1.176 123 129 1 .685 124 132 1 .898 125 133 1 1.253 126 134 1 .711 127 135 1 .230 128 137 1 .745 129 138 1 .847 130 179 1 .510 131 180 1 .289 132 182 1 .776 133 187 1 1.242 134 188 1 .289 135 189 1 .661 136 190 1 .684 137 191 1 .376 138 192 1 1.697 139 193 1 1.198 140 199 1 .401 141 212 1 1.032 142 213 1 .954 143 214 1 .610 144 218 1 .627 145 231 1 1.428 146 234 1 1.261 147 242 1 2.487 148 244 2 1.818 149 245 1 1.961 150 253 3 1.723 151 255 1 1.693 152 256 1 1.521 153 257 1 1.929 154 260 1 1.064 155 265 1 1.154 156 267 1 2.325 157 280 1 2.041 158 290 1 .975 159 291 1 1.294 160 292 1 .880 161 295 1 1.324 162 296 1 1.713 163 299 1 .837 Cluster Membership Case Number ID Cluster Distance 164 301 1 .437 165 302 1 .910 166 315 1 1.967 167 325 1 .720 168 327 1 1.182 169 329 1 .545 170 332 1 1.340 171 336 1 .879 172 337 1 1.112 173 338 1 .987 174 22 2 .395 175 26 2 .685 176 29 2 1.011 177 34 2 .772 178 36 2 .653 179 46 2 1.253 180 47 2 1.025 181 48 2 1.019 182 49 2 1.053 183 50 2 1.160 184 57 2 1.078 185 58 2 .841 186 60 2 .721 187 63 2 1.231 188 64 2 .699 189 65 2 .563 190 66 2 .760 191 67 2 .468 192 68 2 .732 193 70 2 1.033 194 74 2 .638 195 76 2 .939 196 83 2 1.002 197 90 2 .730 198 99 2 .895 199 105 2 .831 200 106 2 .721 201 114 2 .546 202 116 2 1.076 203 118 2 1.196 204 122 2 .625 205 125 2 .516 206 128 2 .573 207 130 2 .709 208 131 2 .793 209 136 2 .903 210 139 2 .781 211 140 2 .858 212 141 2 .662 Cluster Membership Case Number ID Cluster Distance 213 142 2 .839 214 143 2 .662 215 144 2 1.626 216 145 2 .452 217 146 2 .516 218 147 2 .698 219 148 2 .641 220 150 2 .921 221 151 2 .376 222 152 2 .811 223 153 2 .614 224 154 2 .599 225 155 2 .516 226 156 2 .484 227 157 2 .677 228 158 2 .516 229 159 2 .614 230 160 2 .794 231 161 2 .794 232 162 2 .603 233 163 2 .912 234 164 2 .721 235 165 2 .699 236 166 2 .850 237 167 2 .699 238 168 2 .733 239 169 2 .700 240 170 2 .485 241 171 2 .794 242 172 2 .636 243 173 2 .753 244 174 2 .653 245 175 2 1.358 246 176 2 .850 247 195 2 .856 248 208 2 1.076 249 215 2 .564 250 216 2 .451 251 217 2 .820 252 219 2 .515 253 220 2 .641 254 221 2 1.027 255 222 2 .707 256 223 2 .505 257 224 2 1.592 258 225 2 .941 259 226 2 .535 260 227 2 .652 261 228 2 .641 Cluster Membership Case Number ID Cluster Distance 262 229 2 .468 263 230 2 1.611 264 232 2 1.036 265 233 2 1.088 266 235 2 .832 267 236 2 1.392 268 237 2 .946 269 238 2 .376 270 239 2 .774 271 240 2 .850 272 241 2 1.054 273 243 2 .573 274 248 2 1.017 275 249 2 .868 276 250 2 1.394 277 251 2 1.696 278 252 2 .590 279 258 2 .832 280 259 2 .468 281 261 2 .515 282 262 2 .415 283 263 2 1.077 284 264 2 .434 285 266 2 1.878 286 269 2 .937 287 270 2 .590 288 271 2 .500 289 272 2 .588 290 273 2 .626 291 274 2 .832 292 275 2 .468 293 276 2 .831 294 277 2 .500 295 278 2 .707 296 279 2 .545 297 281 2 .830 298 282 2 .707 299 283 2 .886 300 284 2 .468 301 285 2 .484 302 286 2 .707 303 287 2 .613 304 288 2 .395 305 289 2 .640 306 293 2 .672 307 294 2 .878 308 297 2 1.413 309 298 2 .638 310 300 2 1.370 Cluster Membership Case Number ID Cluster Distance 311 303 2 .707 312 304 2 .729 313 305 2 .685 314 306 2 .545 315 307 2 .937 316 308 2 .624 317 309 2 .830 318 310 2 .628 319 311 2 .832 320 312 2 .564 321 313 2 .699 322 314 2 .832 323 316 2 .486 324 317 2 1.348 325 318 2 .577 326 319 2 .616 327 320 2 .832 328 321 2 .771 329 322 2 .791 330 323 2 .468 331 324 2 .468 332 326 2 .452 333 328 2 .763 334 330 2 .721 335 331 2 .718 336 333 2 .840 337 334 2 .904 338 335 2 1.118 339 339 2 .652 Final Cluster Centers Cluster 1 2 3 OC.EMPDEV 3.94 4.72 3.68 OC.HARM 4.03 4.75 3.63 OC.CUSTORI 4.06 4.47 3.70 OC.SOCRES 4.18 4.55 2.90 OC.INNOV 3.89 4.75 3.58

**Distances between Final Cluster Centers Cluster 1 2 3** 1 **1.** 477 1.444 **40**
**2**

1.477 2.648 3 1.444 2.648

**ANOVA Cluster Error F Sig. Mean Square df Mean Square df** **154**

OC.EMPDEV 32.290 2 .183 336 176.870 .000 OC.HARM 32.374 2 .174 336 185.623 .000 OC.CUSTORI 13.223 2 .195 336 67.648 .000 OC.SOCRES 51.608 2 .208 336 247.900 .000 OC.INNOV 40.100 2 .212

336 189.143

.000 The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal. Number of Cases in each Cluster 1 121.000 Cluster 13

2 169.000 3 49.000 Valid 339.000 Missing .000 INITIAL MEASUREMENT MODEL (WITH ALL ITEMS)

Model Fit Summary CMIN Model NPAR CMIN DF P CMIN/DF Default model 6

211 3106.878 1619

.000 1. 919 Saturated model 1830 .000 0 Independence model 7

60 12699.726 1770 .000 7.175

RMR, GFI Model RMR GFI AGFI PGFI Default model .063 .762 .730 .674 Saturated model .000 1.000 Independence model 7

.279 .194 .167 .188

Baseline Comparisons Model NFI RFI IFI TLI Delta1 rho1 Delta2 rho2 CFI Default model .755 .733 .866 .851 .864 Saturated model 1.000 1.000 1.000 Independence model .000 .000 .000 .000 .000 Parsimony-Adjusted Measures Model PRATIO PNFI PCFI Default model .915 .691 .790 Saturated model .000 .000 .000 Independence model 1.000 .000 .000 NCP Model NCP LO 90 HI 90 Default model 31

1487.878 1334.029 1649.472 Saturated model .000 .000 .000 Independence model 10929.726 10575.453 11290.590

FMIN Model FMIN F0 LO 90 HI 90 Default model 9.192 4. 162

402 3.947 4.880

Saturated model .000 .000 .000 .000 Independence model 7

37.573 32.336 31.288 33.404

RMSEA Model RMSEA LO 90 HI 90 PCLOSE Default model 7

.052 .049 .055 .101 Independence model .135 .133 .137

**.000 AIC Model AIC BCC BIC CAIC Default model** 7

3528.878 3621.810 4336.164 4547.164 Saturated model 3660.000 4465.993 10661.580 12491.580 Independence model 12819.726 12846.152 13049.286 13109.286

**ECVI Model ECVI LO 90 HI 90 MECVI Default model** 7

10.440 9.985 10.919 10.715 Saturated model 10.828 10.828 10.828 13.213 Independence model 37.928 36.880 38.996 38.006

**HOELTER Model HOELTER HOELTER .05 .01 Default model 187** 191 **113**
**Independence model**

50 51

**Regression Weights: (Group number 1 - Default model) Estimate S.E. C.R. P Label** 7

OCB.Spo.4 <--- Sports 1.000 OCB.Spo.3 <--- Sports 1.126 .063 17.765 *** OCB.Spo.2 <--- Sports 1.141 .059 19.447 *** OCB.Spo.1 <--- Sports .985 .058 16.975 *** OCB.Con.4 <--- Consent 1.000 OCB.Con.3 <--- Consent 1.212 .083 14.532 *** OCB.Con.2 <--- Consent 1.205 .082 14.704 *** OC.EmpDev.4 <--- EmpDev 1.000 OC.EmpDev.3 <--- EmpDev .991 .061 16.199 *** OC.EmpDev.2 <--- EmpDev .804 .059 13.638 *** OC.Harmony.4 <--- Harmony 1.000 OC.Harmony.3 <--- Harmony 1.236 .098 12.618 *** OC.Harmony.2 <--- Harmony 1.097 .092 11.982 *** OC.CustOrient.4 <--- CustOrient 1.000 OC.CustOrient.3 <--- CustOrient 1.371 .194 7.078 *** OC.SocRes.4 <--- SocRes 1.000 OC.SocRes.3 <--- SocRes 1.105 .051 21.542 *** OC.SocRes.2 <--- SocRes .618 .052 11.850 *** OC.Innov.4 <--- Innov 1.000 OC.Innov.3 <--- Innov 1.002 .075 13.442 *** OC.Innov.2 <--- Innov 1.094 .080 13.725 *** OC.Innov.1 <--- Innov .873 .069 12.593 *** MT.Man.2 <--- Man 1.000 MT.Man.1 <--- Man .786 .106 7.404 *** MT.Res.3 <--- Res 1.000 MT.Res.2 <--- Res .977 .051 19.191 *** MT.Res.1 <--- Res .825 .057 14.523 *** MT.Gov.3 <--- Gov 1.000 MT.Gov.2 <--- Gov 1.032 .063 16.308 *** MT.Gov.1 <--- Gov .733 .062 11.757 *** OCB.Alt.4 <--- Alt .896 .065 13.808 *** OCB.Alt.3 <--- Alt 1.011 .069 14.649 *** OCB.Alt.2 <--- Alt .785 .061 12.956 ***

**Estimate S.E. C.R. P Label** OCB.Alt **.1**<--- Alt **1.000** OC.CustOrient **.2**<--- CustOrient **1.** 6

411 .197 7.171 *** OCB.Con.1 <--- Consent .904 .082 10.996 *** RA3 <--- RA 1.074 .083 12.927 *** RA2 <--- RA 1.222 .085 14.394 *** RA1 <--- RA 1.148 .078 14.707 *** RA5 <--- RA 1.000 RA4 <--- RA .280 .080 3.508 *** IBOI.3 <--- Inbound .324 .063 5.133 *** IBOI.6 <--- Inbound 1.000 IBOI.5 <--- Inbound 1.032 .065 15.993 *** IBOI.2 <--- Inbound .876 .065 13.570 *** OBOI.3 <--- Out-bound 1.000 OBOI.2 <--- Out-bound .474 .063 7.488 *** OBOI.1 <--- Out-bound .776 .058 13.420 *** OC.CustOrient.5 <--- CustOrient 1.343 .191 7.042 *** OC.EmpDev.5 <--- EmpDev .701 .062 11.281 *** OC.Harmony.5 <--- Harmony 1.170 .095 12.338 *** OC.EmpDev.1 <--- EmpDev .810 .071 11.368 *** OC.Harmony.1 <--- Harmony 1.245 .106 11.714 *** OC.CustOrient.1 <--- CustOrient 1.357 .194 6.992 *** OC.SocRes.1 <--- SocRes .476 .059 8.083 *** MT.Man.3 <--- Man 1.557 .152 10.221 *** RA6 <--- RA .859 .078 11.078 *** IBOI.4 <--- Inbound .805 .115 7.017 *** IBOI.1 <--- Inbound .727 .058 12.484 *** OBOI.4 <--- Out-bound .998 .071 14.022 ***

**Standardized Regression Weights: (Group number 1 - Default model) Estimate** OCB.Spo **.4** 6

<--- Sports .802 OCB.Spo.3 <--- Sports .848 OCB.Spo.2 <--- Sports .913 OCB.Spo.1 <--- Sports .820 OCB.Con.4 <--- Consent .726 OCB.Con.3 <--- Consent .849 OCB.Con.2 <--- Consent .865 OC.EmpDev.4 <--- EmpDev .787 OC.EmpDev.3 <--- EmpDev .836 OC.EmpDev.2 <--- EmpDev .720 OC.Harmony.4 <--- Harmony .681 OC.Harmony.3 <--- Harmony .775 OC.Harmony.2 <--- Harmony .730 OC.CustOrient.4 <--- CustOrient .428 Estimate OC.CustOrient.3 <--- CustOrient .703 OC.SocRes.4 <--- SocRes .883 OC.SocRes.3 <--- SocRes .932 OC.SocRes.2 <--- SocRes .590 OC.Innov.4 <--- Innov .710 OC.Innov.3 <--- Innov .802 OC.Innov.2 <--- Innov .823 OC.Innov.1 <--- Innov .746 MT.Man.2 <--- Man .601 MT.Man.1 <--- Man .485 MT.Res.3 <--- Res .869 MT.Res.2 <--- Res .867 MT.Res.1 <--- Res .705 MT.Gov.3 <--- Gov .823 MT.Gov.2 <--- Gov .848 MT.Gov.1 <--- Gov .630 OCB.Alt.4 <--- Alt .739 OCB.Alt.3 <--- Alt .782 OCB.Alt.2 <--- Alt .698 OCB.Alt.1 <--- Alt .821 OC.CustOrient.2 <--- CustOrient .732 OCB.Con.1 <--- Consent .633 RA3 <--- RA .720 RA2 <--- RA .798 RA1 <--- RA .815 RA5 <--- RA .744 RA4 <--- RA .201 IBOI.3 <--- Inbound .290 IBOI.6 <--- Inbound .786 IBOI.5 <--- Inbound .818 IBOI.2 <--- Inbound .712 OBOI.3 <--- Out-bound .806 OBOI.2 <--- Out-bound .432 OBOI.1 <--- Out-bound .750 OC.CustOrient.5 <--- CustOrient .693 OC.EmpDev.5 <--- EmpDev .611 OC.Harmony.5 <--- Harmony .755 OC.EmpDev.1 <--- EmpDev .615 OC.Harmony.1 <--- Harmony .712 OC.CustOrient.1 <--- CustOrient .679 OC.SocRes.1 <--- SocRes .429 MT.Man.3 <--- Man .868 RA6 <--- RA .622 IBOI.4 <--- Inbound .392 Estimate IBOI.1 <--- Inbound .663 OBOI.4 <--- Out-bound .792

**Covariances: (Group number 1 - Default model) Estimate S.E. C.R. P Label** 6

Sports <--> Consent .058 .050 1.158 .247 Sports <--> EmpDev .327 .057 5.709 *** Sports <--> Harmony .307 .048 6.452 *** Sports <--> CustOrient .133 .034 3.958 *** Sports <--> SocRes .280 .061 4.623 *** Sports <--> Innov .223 .053 4.171 *** Sports <--> Man .414 .085 4.869 *** Sports <--> Res .552 .105 5.282 *** Sports <--> Gov .613 .104 5.912 *** Sports <--> Alt -.042 .059 -.718 .473 Consent <--> EmpDev -.018 .025 -.701 .483 Consent <--> Harmony .015 .019 .772 .440 Consent <--> CustOrient .031 .014 2.160 .031 Consent <--> SocRes .041 .028 1.460 .144 Consent <--> Innov .016 .025 .644 .519 Consent <--> Man .033 .036 .921 .357 Consent <--> Res .006 .047 .130 .897 Consent <--> Gov .012 .045 .260 .795 Consent <--> Alt .163 .032 5.089 *** EmpDev <--> Harmony .240 .029 8.274 *** EmpDev <--> CustOrient .122 .022 5.483 *** EmpDev <--> SocRes .235 .034 7.007 *** EmpDev <--> Innov .269 .034 7.844 *** EmpDev <--> Man .255 .046 5.594 *** EmpDev <--> Res .316 .054 5.873 *** EmpDev <--> Gov .405 .056 7.236 *** EmpDev <--> Alt -.018 .030 -.599 .549 Harmony <--> CustOrient .104 .019 5.578 *** Harmony <--> SocRes .209 .028 7.415 *** Harmony <--> Innov .176 .026 6.884 *** Harmony <--> Man .214 .037 5.766 *** Harmony <--> Res .250 .043 5.864 *** Harmony <--> Gov .309 .045 6.939 *** Harmony <--> Alt -.015 .023 -.642 .521 CustOrient <--> SocRes .114 .022 5.121 *** CustOrient <--> Innov .101 .020 5.012 *** CustOrient <--> Man .106 .026 4.053 *** CustOrient <--> Res .117 .031 3.756 *** CustOrient <--> Gov .160 .034 4.723 *** Estimate S.E. C.R. P Label CustOrient <--> Alt .035 .017 2.059 .039 SocRes <--> Innov .202 .033 6.211 *** SocRes <--> Man .253 .048 5.218 *** SocRes <--> Res .303 .058 5.235 *** SocRes <--> Gov .343 .057 5.971 *** SocRes <--> Alt -.060 .033 -1.796 .073 Innov <--> Man .193 .042 4.617 *** Innov <--> Res .275 .053 5.245 *** Innov <--> Gov .364 .055 6.623 *** Innov <--> Alt -.015 .029 -.508 .611 Man <--> Res .753 .103 7.277 *** Man <--> Gov .685 .098 7.015 *** Man <--> Alt -.047 .043 -1.093 .274 Res <--> Gov .951 .111 8.604 *** Res <--> Alt -.139 .057 -2.442 .015 Gov <--> Alt -.093 .054 -1.715 .086 Sports <--> RA .403 .060 6.681 *** Consent <--> RA .041 .025 1.644 .100 EmpDev <--> RA .249 .033 7.611 *** Harmony <--> RA .206 .027 7.583 *** CustOrient <--> RA .114 .021 5.319 *** SocRes <--> RA .262 .035 7.494 *** Innov <--> RA .211 .031 6.749 *** Man <--> RA .298 .049 6.122 *** Res <--> RA .446 .059 7.559 *** Gov <--> RA .390 .056 7.020 *** Alt <--> RA .009 .029 .309 .757 Sports <--> Inbound .358 .057 6.320 *** Consent <--> Inbound .004 .024 .151 .880 EmpDev <--> Inbound .302 .034 8.800 *** Harmony <--> Inbound .228 .028 8.234 *** CustOrient <--> Inbound .135 .023 5.790 *** SocRes <--> Inbound .253 .033 7.588 *** Innov <--> Inbound .272 .034 8.067 *** Man <--> Inbound .263 .045 5.840 *** Res <--> Inbound .426 .056 7.582 *** Gov <--> Inbound .447 .056 7.934 *** Alt <--> Inbound -.002 .029 -.081 .936 RA <--> Inbound .269 .033 8.154 *** Sports <--> Out-bound .242 .063 3.843 *** Consent <--> Out-bound .160 .032 4.923 *** EmpDev <--> Out-bound .084 .031 2.714 .007 Harmony <--> Out-bound .074 .024 3.093 .002 CustOrient <--> Out-bound .085 .020 4.138 *** Estimate S.E. C.R. P Label SocRes <--> Out-bound .076 .034 2.214 .027 Innov <--> Out-bound .041 .030 1.367 .171 Man <--> Out-bound .023 .043 .533 .594 Res <--> Out-bound -.049 .057 -.847 .397 Gov <--> Out-bound .027 .055 .491 .624 Alt <--> Out-bound .191 .038 5.041 *** RA <--> Out-bound .119 .031 3.790 *** Inbound <--> Out-bound .078 .030 2.621 .009 Correlations: (Group

number 1 - Default model) Estimate Sports <--> Consent .070 Sports <--> EmpDev .390 Sports <--> Harmony .483 Sports <--> CustOrient .301 Sports <--> SocRes .292 Sports <--> Innov .273 Sports <--> Man .361 Sports <--> Res .347 Sports <--> Gov .409 Sports <--> Alt -.044 Consent <--> EmpDev -.044 Consent <--> Harmony .049 Consent <--> CustOrient .147 Consent <--> SocRes .089 Consent <--> Innov .040 Consent <--> Man .060 Consent <--> Res .008 Consent <--> Gov .016 Consent <--> Alt .353 EmpDev <--> Harmony .777 EmpDev <--> CustOrient .562 EmpDev <--> SocRes .502 EmpDev <--> Innov .675 EmpDev <--> Man .456 EmpDev <--> Res .407 EmpDev <--> Gov .554 EmpDev <--> Alt -.038 Harmony <--> CustOrient .636 Harmony <--> SocRes .588 Harmony <--> Innov .583 Harmony <--> Man .505 Harmony <--> Res .424 Harmony <--> Gov .558 Estimate Harmony <--> Alt -.041 CustOrient <--> SocRes .459 CustOrient <--> Innov .477 CustOrient <--> Man .358 CustOrient <--> Res .284 CustOrient <--> Gov .414 CustOrient <--> Alt .141 SocRes <--> Innov .443 SocRes <--> Man .394 SocRes <--> Res .340 SocRes <--> Gov .409 SocRes <--> Alt -.111 Innov <--> Man .354 Innov <--> Res .363 Innov <--> Gov .510 Innov <--> Alt -.032 Man <--> Res .706 Man <--> Gov .683 Man <--> Alt -.073 Res <--> Gov .683 Res <--> Alt -.156 Gov <--> Alt -.111 Sports <--> RA .487 Consent <--> RA .103 EmpDev <--> RA .616 Harmony <--> RA .674 CustOrient <--> RA .532 SocRes <--> RA .565 Innov <--> RA .535 Man <--> RA .538 Res <--> RA .580 Gov <--> RA .540 Alt <--> RA .020 Sports <--> Inbound .447 Consent <--> Inbound .009 EmpDev <--> Inbound .771 Harmony <--> Inbound .769 CustOrient <--> Inbound .652 SocRes <--> Inbound .564 Innov <--> Inbound .713 Man <--> Inbound .491 Res <--> Inbound .571 Gov <--> Inbound .637 Alt <--> Inbound -.005 Estimate RA <--> Inbound .696 Sports <--> Out-bound .250 Consent <--> Out-bound .344 EmpDev <--> Out-bound .178 Harmony <--> Out-bound .207 CustOrient <--> Out-bound .337 SocRes <--> Out-bound .140 Innov <--> Out-bound .088 Man <--> Out-bound .036 Res <--> Out-bound -.054 Gov <--> Out-bound .032 Alt <--> Out-bound .352 RA <--> Out-bound .254 Inbound <--> Out-bound .173

**Variances: (Group number 1 - Default model) Estimate S.E. C.R. P Label** Sports **1.** 6

715 .197 8.685 *** Consent .395 .054 7.368 *** EmpDev .408 .049 8.305 *** Harmony .234 .034 6.806 *** CustOrient .115 .030 3.788 *** SocRes .538 .055 9.862 *** Innov .388 .054 7.143 *** Man .767 .138 5.561 *** Res 1.480 .154 9.621 *** Gov 1.308 .151 8.680 *** Alt .538 .063 8.572 *** RA .399 .052 7.675 *** Inbound .375 .045 8.329 *** Out-bound .548 .067 8.222 *** e1 .360 .035 10.321 *** e2 .349 .037 9.449 *** e3 .349 .032 10.902 *** e4 .260 .031 8.359 *** e5 .954 .087 10.929 *** e6 .848 .085 9.971 *** e7 .448 .062 7.246 *** e8 .810 .076 10.614 *** e9 .355 .032 11.005 *** e10 .225 .028 8.077 *** e11 .192 .026 7.396 *** e12 .252 .024 10.372 *** e13 .173 .019 9.234 *** Estimate S.E. C.R. P Label e14 .245 .022 11.269 *** e15 .271 .023 11.621 *** e16 .238 .023 10.572 *** e17 .247 .022 11.168 *** e18 .511 .041 12.427 *** e19 .221 .021 10.461 *** e20 .153 .021 7.370 *** e21 .099 .022 4.494 *** e22 .386 .031 12.376 *** e23 .381 .034 11.139 *** e24 .216 .022 9.647 *** e25 .222 .024 9.114 *** e26 .235 .022 10.691 *** e27 1.354 .119 11.404 *** e28 1.545 .127 12.184 *** e29 .478 .061 7.880 *** e30 .467 .058 7.987 *** e31 1.019 .089 11.456 *** e32 .624 .072 8.628 *** e33 .544 .070 7.715 *** e34 1.067 .091 11.710 *** e35 .198 .020 9.996 *** e36 .482 .041 11.822 *** e37 .740 .057 12.934 *** e38 .427 .038 11.300 *** e39 .339 .033 10.206 *** e40 .265 .027 9.841 *** e41 .323 .029 11.045 *** e42 .198 .020 9.943 *** e43 .429 .033 12.867 *** e44 .233 .022 10.582 *** e45 .295 .036 8.272 *** e46 .536 .043 12.449 *** e47 .257 .026 9.766 *** e48 .280 .024 11.478 *** e49 .224 .021 10.603 *** e50 .337 .028 12.054 *** e51 .242 .022 10.866 *** e52 .440 .037 12.033 *** e53 .354 .031 11.357 *** e54 .247 .023 10.782 *** e55 .538 .042 12.743 *** e56 .608 .130 4.683 *** e57 .467 .039 12.012 ***

**Estimate S.E. C.R. P Label** e58 **1.** 6

338 .105 12.737 *** e59 .252 .021 11.847 *** e60 .325 .037 8.711 *** FINAL MEASUREMENT MODEL (SOME ITEMS REMOVED)

**Model Fit Summary CMIN Model NPAR CMIN DF P CMIN/DF Default model** 6

193 2002.733 1133

.000 1. 768 Saturated model 1326 .000 0 Independence model 7

51 10946.404 1275

.000 8. 585 RMR, GFI Model RMR GFI AGFI PGFI Default model 31

.052 .808 .775 .690

Saturated model .000 1.000 Independence model .302 378

.202 .170 .194

Baseline Comparisons Model NFI RFI IFI TLI Delta1 rho1 Delta2 rho2 CFI Default model .817 .794 .911 .899 .910 Saturated model 1.000 1.000 1.000 Independence model .000 .000 .000 .000 .000 Parsimony-Adjusted Measures Model PRATIO PNFI PCFI Default model .889 .726 .809 Saturated model .000 .000 .000 Independence model 1.000 .000 .000 NCP Model NCP LO 90 HI 90 Default model 6

869.733 748.938 998.349 Saturated model .000 .000 .000 Independence model 9671.404 9340.669 10008.678

FMIN Model FMIN F0 LO 90 HI 90 Default model 5.925 2. 573 2. 216 2. 954 Saturated model .000 .000 .000 .000 Independence 113

model 32.386 28.614 27.635 29.611

RMSEA Model RMSEA LO 90 HI 90 PCLOSE Default model 7

.048 .044 .051 .870 Independence model .150 .147 .152

.000 AIC Model AIC BCC BIC CAIC Default model 2388.733 2458 .915 162

3127.151 3320.151 Saturated model 2652.000 3134.182 7725.276 9051.276 Independence model 11048.404 11066.950 11243.530 11294.530 ECVI Model ECVI

LO 90 HI 90 MECVI Model ECVI LO 90 HI 90 MECVI Default model 6

7.067 6.710 7.448 7.275

Saturated model 7. 846 7. 846 7. 846 9. 273 Independence model 458

32.688 31.709 33.685 32.742

**HOELTER Model HOELTER HOELTER .05 .01 Default model** 205 211 **Independence model** 7

42 44

**Regression Weights: (Group number 1 - Default model) Estimate S.E. C.R. P Label** 7

OCB.Spo.4 <--- Sports 1.000 OCB.Spo.3 <--- Sports 1.126 .063 17.779 *** OCB.Spo.2 <--- Sports 1.140 .059 19.456 *** OCB.Spo.1 <--- Sports .985 .058 16.988 *** OCB.Con.4 <--- Consent 1.000 OCB.Con.3 <--- Consent 1.212 .083 14.542 *** OCB.Con.2 <--- Consent 1.204 .082 14.702 *** OC.EmpDev.4 <--- EmpDev 1.000 OC.EmpDev.3 <--- EmpDev 1.014 .059 17.204 *** OC.EmpDev.2 <--- EmpDev .738 .054 13.780 *** OC.Harmony.4 <--- Harmony 1.000 OC.Harmony.3 <--- Harmony 1.217 .095 12.812 *** OC.Harmony.2 <--- Harmony 1.098 .089 12.348 *** OC.CustOrient.3 <--- CustOrient 1.038 .096 10.811 *** OC.SocRes.4 <--- SocRes 1.000 OC.SocRes.3 <--- SocRes 1.090 .052 20.900 *** OC.SocRes.2 <--- SocRes .604 .052 11.646 *** OC.Innov.4 <--- Innov 1.000 OC.Innov.3 <--- Innov .999 .074 13.479 *** OC.Innov.2 <--- Innov 1.092 .079 13.787 *** OC.Innov.1 <--- Innov .868 .069 12.598 *** MT.Man.2 <--- Man 1.000 MT.Res.3 <--- Res 1.000 MT.Res.2 <--- Res .973 .050 19.298 *** MT.Res.1 <--- Res .820 .057 14.500 *** MT.Gov.3 <--- Gov 1.000 MT.Gov.2 <--- Gov 1.035 .063 16.316 *** MT.Gov.1 <--- Gov .728 .062 11.667 *** OCB.Alt.4 <--- Alt .893 .065 13.801 *** OCB.Alt.3 <--- Alt 1.008 .069 14.652 *** OCB.Alt.2 <--- Alt .783 .060 12.966 *** OCB.Alt.1 <--- Alt 1.000 OC.CustOrient.2 <--- CustOrient 1.108 .097 11.443 ***

**Estimate S.E. C.R. P Label** OCB.Con **.1** 6

<--- Consent .904 .082 11.004 *** RA3 <--- RA 1.068 .083 12.897 *** RA2 <--- RA 1.219 .085 14.417 *** RA1 <--- RA 1.143 .078 14.702 *** RA5 <--- RA 1.000 IBOI.6 <--- Inbound 1.000 IBOI.5 <--- Inbound 1.035 .064 16.108 *** IBOI.2 <--- Inbound .871 .064 13.518 *** OBOI.3 <--- Out-bound 1.000 OBOI.1 <--- Out-bound .791 .060 13.188 *** OC.CustOrient.5 <--- CustOrient 1.000 OC.EmpDev.5 <--- EmpDev .684 .060 11.328 *** OC.Harmony.5 <--- Harmony 1.126 .092 12.282 *** OC.CustOrient.1 <--- CustOrient 1.034 .098 10.567 *** MT.Man.3 <--- Man 2.009 .256 7.835 *** RA6 <--- RA .858 .077 11.100 *** IBOI.1 <--- Inbound .719 .058 12.357 *** OBOI.4 <--- Out-bound 1.014 .074 13.646 ***

**Standardized Regression Weights: (Group number 1 - Default model) Estimate** OCB.Spo **.4** 6

<--- Sports .802 OCB.Spo.3 <--- Sports .848 OCB.Spo.2 <--- Sports .912 OCB.Spo.1 <--- Sports .820 OCB.Con.4 <--- Consent .726 OCB.Con.3 <--- Consent .849 OCB.Con.2 <--- Consent .865 OC.EmpDev.4 <--- EmpDev .802 OC.EmpDev.3 <--- EmpDev .872 OC.EmpDev.2 <--- EmpDev .717 OC.Harmony.4 <--- Harmony .698 OC.Harmony.3 <--- Harmony .782 OC.Harmony.2 <--- Harmony .749 OC.CustOrient.3 <--- CustOrient .702 OC.SocRes.4 <--- SocRes .891 OC.SocRes.3 <--- SocRes .928 OC.SocRes.2 <--- SocRes .582 OC.Innov.4 <--- Innov .712 OC.Innov.3 <--- Innov .802 OC.Innov.2 <--- Innov .824 OC.Innov.1 <--- Innov .744 MT.Man.2 <--- Man .516 MT.Res.3 <--- Res .872 Estimate MT.Res.2 <--- Res .866 MT.Res.1 <--- Res .703 MT.Gov.3 <--- Gov .823 MT.Gov.2 <--- Gov .850 MT.Gov.1 <--- Gov .626 OCB.Alt.4 <--- Alt .738 OCB.Alt.3 <--- Alt .781 OCB.Alt.2 <--- Alt .698 OCB.Alt.1 <--- Alt .822 OC.CustOrient.2 <--- CustOrient .758 OCB.Con.1 <--- Consent .634 RA3 <--- RA .718 RA2 <--- RA .798 RA1 <--- RA .813 RA5 <--- RA .745 IBOI.6 <--- Inbound .789 IBOI.5 <--- Inbound .824 IBOI.2 <--- Inbound .711 OBOI.3 <--- Out-bound .797 OBOI.1 <--- Out-bound .755 OC.CustOrient.5 <--- CustOrient .680 OC.EmpDev.5 <--- EmpDev .607 OC.Harmony.5 <--- Harmony .745 OC.CustOrient.1 <--- CustOrient .682 MT.Man.3 <--- Man .961 RA6 <--- RA .622 IBOI.1 <--- Inbound .658 OBOI.4 <--- Out-bound .795

**Covariances: (Group number 1 - Default model) Estimate S.E. C.R. P** 6

**Label**

Sports <--> Consent .058 .050 1.158 .247 Sports <--> EmpDev .307 .057 5.369 *** Sports <--> Harmony .303 .048 6.285 *** Sports <--> CustOrient .180 .040 4.441 *** Sports <--> SocRes .285 .061 4.656 *** Sports <--> Innov .224 .054 4.174 *** Sports <--> Man .369 .078 4.734 *** Sports <--> Res .554 .105 5.289 *** Sports <--> Gov .613 .104 5.913 *** Sports <--> Alt -.043 .059 -.718 .473 Consent <--> EmpDev -.020 .026 -.791 .429 Consent <--> Harmony .018 .020 .891 .373 Consent <--> CustOrient .040 .019 2.146 .032 Estimate S.E. C.R. P Label Consent <--> SocRes .041 .028 1.442 .149 Consent <--> Innov .016 .025 .644 .519 Consent <--> Man .021 .029 .742 .458 Consent <--> Res .006 .048 .129 .898 Consent <--> Gov .012 .045 .263 .793 Consent <--> Alt .163 .032 5.091 *** EmpDev <--> Harmony .229 .029 7.990 *** EmpDev <--> CustOrient .147 .023 6.366 *** EmpDev <--> SocRes .228 .034 6.746 *** EmpDev <--> Innov .262 .034 7.695 *** EmpDev <--> Man .205 .041 4.951 *** EmpDev <--> Res .283 .054 5.276 *** EmpDev <--> Gov .385 .056 6.918 *** EmpDev <--> Alt -.012 .030 -.405 .685 Harmony <--> CustOrient .138 .020 6.913 *** Harmony <--> SocRes .211 .029 7.320 *** Harmony <--> Innov .178 .026 6.839 *** Harmony <--> Man .168 .034 4.987 *** Harmony <--> Res .236 .043 5.486 *** Harmony <--> Gov .303 .045 6.738 *** Harmony <--> Alt -.008 .024 -.356 .722 CustOrient <--> SocRes .144 .024 5.895 *** CustOrient <--> Innov .122 .022 5.591 *** CustOrient <--> Man .126 .028 4.465 *** CustOrient <--> Res .155 .038 4.120 *** CustOrient <--> Gov .204 .038 5.328 *** CustOrient <--> Alt .046 .022 2.114 .035 SocRes <--> Innov .201 .033 6.128 *** SocRes <--> Man .206 .044 4.737 *** SocRes <--> Res .308 .059 5.252 *** SocRes <--> Gov .343 .058 5.926 *** SocRes <--> Alt -.060 .034 -1.764 .078 Innov <--> Man .166 .037 4.437 *** Innov <--> Res .277 .053 5.255 *** Innov <--> Gov .364 .055 6.626 *** Innov <--> Alt -.015 .029 -.510 .610 Man <--> Res .620 .102 6.086 *** Man <--> Gov .551 .094 5.897 *** Man <--> Alt -.052 .035 -1.497 .134 Res <--> Gov .955 .111 8.618 *** Res <--> Alt -.140 .057 -2.445 .014 Gov <--> Alt -.094 .054 -1.721 .085 Sports <--> RA .410 .061 6.750 *** Consent <--> RA .041 .025 1.636 .102

**Estimate S.E. C.R. P Label** EmpDev <--> RA .237 **.032** 6

7.322 *** Harmony <--> RA .207 .028 7.535 *** CustOrient <--> RA .150 .023 6.473 *** SocRes <--> RA .266 .035 7.527 *** Innov <--> RA .212 .031 6.764 *** Man <--> RA .248 .046 5.413 *** Res <--> RA .446 .059 7.544 *** Gov <--> RA .390 .056 7.011 *** Alt <--> RA .009 .029 .292 .770 Sports <--> Inbound .356 .057 6.258 *** Consent <--> Inbound .001 .024 .060 .953 EmpDev <--> Inbound .290 .034 8.566 *** Harmony <--> Inbound .224 .028 8.097 *** CustOrient <--> Inbound .170 .024 7.191 *** SocRes <--> Inbound .254 .034 7.541 *** Innov <--> Inbound .277 .034 8.126 *** Man <--> Inbound .213 .041 5.164 *** Res <--> Inbound .420 .056 7.484 *** Gov <--> Inbound .444 .056 7.883 *** Alt <--> Inbound -.004 .029 -.122 .903 RA <--> Inbound .270 .033 8.153 *** Sports <--> Out-bound .247 .063 3.924 *** Consent <--> Out-bound .158 .032 4.900 *** EmpDev <--> Out-bound .085 .031 2.708 .007 Harmony <--> Out-bound .078 .025 3.172 .002 CustOrient <--> Out-bound .117 .024 4.837 *** SocRes <--> Out-bound .078 .034 2.280 .023 Innov <--> Out-bound .041 .030 1.382 .167 Man <--> Out-bound .035 .035 1.006 .314 Res <--> Out-bound -.044 .057 -.777 .437 Gov <--> Out-bound .032 .055 .583 .560 Alt <--> Out-bound .186 .038 4.938 *** RA <--> Out-bound .125 .031 3.975 *** Inbound <--> Out-bound .084 .030 2.798 .005 Correlations: (Group number 1 - Default model) Estimate Sports <--> Consent .070 Sports <--> EmpDev .360 Sports <--> Harmony .466 Sports <--> CustOrient .307 Sports <--> SocRes .294 Sports <--> Innov .273 Sports <--> Man .375 Estimate Sports <--> Res .347 Sports <--> Gov .409 Sports <--> Alt -.044 Consent <--> EmpDev -.049 Consent <--> Harmony .057 Consent <--> CustOrient .142 Consent <--> SocRes .088 Consent <--> Innov .040 Consent <--> Man .045 Consent <--> Res .008 Consent <--> Gov .017 Consent <--> Alt .353 EmpDev <--> Harmony .707 EmpDev <--> CustOrient .505 EmpDev <--> SocRes .473 EmpDev <--> Innov .644 EmpDev <--> Man .419 EmpDev <--> Res .355 EmpDev <--> Gov .516 EmpDev <--> Alt -.026 Harmony <--> CustOrient .624 Harmony <--> SocRes .574 Harmony <--> Innov .574 Harmony <--> Man .451 Harmony <--> Res .390 Harmony <--> Gov .533 Harmony <--> Alt -.023 CustOrient <--> SocRes .435 CustOrient <--> Innov .436 CustOrient <--> Man .375 CustOrient <--> Res .285 CustOrient <--> Gov .399 CustOrient <--> Alt .142 SocRes <--> Innov .435 SocRes <--> Man .371 SocRes <--> Res .341 SocRes <--> Gov .405 SocRes <--> Alt -.110 Innov <--> Man .354 Innov <--> Res .363 Innov <--> Gov .510 Innov <--> Alt -.032 Man <--> Res .676 Man <--> Gov .642 Estimate Man <--> Alt -.094 Res <--> Gov .684 Res <--> Alt -.156 Gov <--> Alt -.111 Sports <--> RA .494 Consent <--> RA .103 EmpDev <--> RA .573 Harmony <--> RA .661 CustOrient <--> RA .531 SocRes <--> RA .568 Innov <--> RA .536 Man <--> RA .521 Res <-->

RA .577 Gov <--> RA .539 Alt <--> RA .018 Sports <--> Inbound .441 Consent <--> Inbound .004 EmpDev <--> Inbound .724 Harmony <--> Inbound .735 CustOrient <--> Inbound .621 SocRes <--> Inbound .559 Innov <--> Inbound .721 Man <--> Inbound .462 Res <--> Inbound .560 Gov <--> Inbound .631 Alt <--> Inbound -.008 RA <--> Inbound .695 Sports <--> Out-bound .257 Consent <--> Out-bound .344 EmpDev <--> Out-bound .178 Harmony <--> Out-bound .216 CustOrient <--> Out-bound .359 SocRes <--> Out-bound .145 Innov <--> Out-bound .090 Man <--> Out-bound .063 Res <--> Out-bound -.050 Gov <--> Out-bound .038 Alt <--> Out-bound .346 RA <--> Out-bound .270 Inbound <--> Out-bound .186

**Variances: (Group number 1 - Default model) Estimate S.E. C.R. P Label** Sports **1.** 6

717 .198 8.691 *** Consent .395 .054 7.371 *** EmpDev .425 .050 8.521 *** Harmony .246 .035 6.957 *** CustOrient .199 .031 6.525 *** SocRes .548 .055 9.915 *** Innov .391 .054 7.171 *** Man .564 .122 4.607 *** Res 1.489 .154 9.673 *** Gov 1.308 .151 8.675 *** Alt .540 .063 8.592 *** RA .401 .052 7.695 *** Inbound .378 .045 8.354 *** Out-bound .535 .067 8.021 *** e1 .361 .035 10.335 *** e2 .350 .037 9.459 *** e3 .349 .032 10.902 *** e4 .258 .031 8.303 *** e5 .952 .087 10.922 *** e6 .847 .085 9.968 *** e7 .449 .062 7.267 *** e8 .810 .076 10.612 *** e9 .354 .032 10.999 *** e10 .224 .028 8.058 *** e11 .193 .026 7.429 *** e12 .235 .024 9.902 *** e13 .138 .018 7.662 *** e14 .219 .019 11.237 *** e15 .259 .023 11.194 *** e16 .231 .023 9.968 *** e17 .232 .022 10.546 *** e19 .221 .021 10.388 *** e20 .143 .022 6.565 *** e21 .104 .024 4.426 *** e22 .392 .032 12.386 *** e23 .379 .034 11.117 *** e24 .217 .022 9.666 *** e25 .221 .024 9.092 *** e26 .237 .022 10.723 *** e27 1.557 .131 11.917 *** e29 .470 .060 7.822 *** e30 .471 .058 8.094 *** e31 1.026 .089 11.495 ***

**Estimate S.E. C.R. P Label** e32 .625 .072 **8.** 7

616 *** e33 .537 .070 7.613 *** e34 1.076 .092 11.737 *** e35 .181 .019 9.350 *** e36 .482 .041 11.819 *** e38 .430 .038 11.319 *** e39 .339 .033 10.198 *** e40 .268 .027 9.870 *** e41 .321 .029 11.017 *** e42 .192 .020 9.642 *** e44 .230 .022 10.410 *** e45 .308 .037 8.318 *** e47 .252 .027 9.463 *** e48 .281 .025 11.422 *** e49 .231 .022 10.685 *** e50 .340 .028 12.042 *** e51 .250 .024 10.614 *** e54 .245 .023 10.664 *** e56 .189 .211 .893 .372 e57 .467 .039 12.005 *** e59 .256 .022 11.827 *** e60 .321 .038 8.380 *** INITIAL AND FINAL MEASUREMENT MODELS FOR EACH VARIABLE ORGANIZATIONAL CITIZENSHIP BEHAVIOUR (INITIAL AND FINAL) ORGANIZATIONAL CULTURE (INITIAL MODEL) ORGANIZATIONAL CULTURE (FINAL MODEL) MANAGERIAL TIES (INITIAL MODEL) MANAGERIAL TIES (FINAL MODEL) REGIMES OF APPROPRIABILITY (INITIAL MODEL) REGIMES OF APPROPRIABILITY (FINAL MODEL) OPEN INNOVATION (INITIAL MODEL) OPEN INNOVATION (FINAL MODEL) HIERARCHICAL REGRESSION – INBOUND OPEN INNOVATION

**Variables Entered/Removed** a **Model Variables Entered Variables** Method **Removed 1** 185

FirmOwnership, Industry b . Enter 2 ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV b . Enter 3 ZRA.TOTAL b . Enter 4 zRAxOCB.CON, zRAxOCB.SPO, zRAxMT.MAN, zRAxOCB.ALT, zRAxMT.GOVT, zRAxMT.RES, HighlyXRA, HierarchyXRA b . Enter a. Dependent Variable: INBOUND.OI b. All requested variables entered. Model Summary e

**Model R R Square Adjusted R Std. Error of** theChange **Statistics** Durbin-Watson **Square Estimate R Square F Change df1 df2 Sig. F Change Change 1** .033 **a** 57

.001 -.005 .60694 .001 .186 2 336 .830 2 .762 b .581 .568 .39795 .580 56.698 8 328 .000 3 .774 c .599 .586 .38972 .018 14.998 1 327 .000 4 .787 d .620 .597 .38442 .020 2.135 8 319 .032 1.839 a. Predictors:

(Constant), FirmOwnership, Industry b. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV c. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL d. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL, zRAxOCB.CON, zRAxOCB.SPO, zRAxMT.MAN, zRAxOCB.ALT, zRAxMT.GOVT, zRAxMT.RES, HighlyXRA, HierarchyXRA

**e. Dependent Variable:** INBOUND.OI **ANOVA** a **Model Sum of Squares** **244**
**df Mean Square F Sig. Regression**

.137 2 .069 .186 .830 b 1 Residual 123.773 336 .368 Total 123.911 338 Regression 71.968 10 7.197 45.445 .000 c 2 Residual 51.943 328 .158 Total 123.911 338 Regression 74.246 11 6.750 44.440 .000 d 3 Residual 49.665 327 .152 Total 123.911 338 Regression 76.769 19 4.040 27.342 .000 e 4 Residual 47.141 319 .148 Total 123.911 338 a. Dependent Variable: INBOUND.OI b. Predictors: (Constant), FirmOwnership, Industry c. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV d. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL e. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL, zRAxOCB.CON, zRAxOCB.SPO, zRAxMT.MAN, zRAxOCB.ALT, zRAxMT.GOVT, zRAxMT.RES, HighlyXRA, HierarchyXRA

**Coefficients a Model Unstandardized Coefficients Standardized** **62**
**Coefficients t Sig. Correlations Collinearity Statistics B Std. Error**
**Beta Zero-order Partial Part Tolerance VIF (Constant)**

4.271 .129 33.126 .000 1 Industry -.013 .030 -.024 -.421 .674-.028 -.023 -.023.953 1.049 FirmOwnership .010 .029 .019 .341 .733.024 .019 .019 .953 1.049 (Constant) 3.941 .087 45.115 .000 Industry .028 .022 .052 1.284 .200-.028 .071 .046 .792 1.262 FirmOwnership .006 .019 .012 .314 .754.024 .017 .011 .928 1.078 ZOCB.ALT .052 .023 .086 2.259 .025.008 .124 .081 .874 1.145 ZOCB.SPO .066 .024 .109 2.689 .008.397 .147 .096 .782 1.278 2 ZOCB.CON .050 .023 .082 2.177 .030-.039 -.119 -.078.892 1.121 ZMT.MAN -.012 .024 -.019 -.489 .625.200 -.027 -.017.835 1.197 ZMT.RES .117 .028 .193 4.234 .000.467 .228 .151 .613 1.631 ZMT.GOV .090 .029 .148 3.093 .002.525 .168 .111 .560 1.787 Highly.Integrative .546 .055 .451 9.896 .000.681 .479 .354 .615 1.627 Hierarchy.Culture -.252 .070 -.147 -3.613 .000-.434 -.196 -.129.775 1.290 (Constant) 4.005 .087 45.978 .000 Industry .022 .021 .040 1.019 .309-.028 .056 .036 .788 1.270 FirmOwnership -.003 .019 -.006 -.169 .866.024 -.009 -.006.913 1.095 ZOCB.ALT .045 .023 .074 1.963 .051.008 .108 .069 .867 1.153 ZOCB.SPO .040 .025 .066 1.610 .108.397 .089 .056 .726 1.377 ZOCB.CON .051 .022 .084 2.274 .024-.039 -.125 -.080.892 1.121 3 ZMT.MAN -.013 .023 -.022 -.562 .575.200 -.031 -.020.835 1.198 ZMT.RES .086 .028 .143 3.062 .002.467 .167 .107 .565 1.770 ZMT.GOV .086 .028 .142 3.028 .003.525 .165 .106 .559 1.789 Highly.Integrative .480 .057 .397 8.486 .000.681 .425 .297 .560 1.786 Hierarchy.Culture -.173 .071 -.101 -2.426 .016-.434 -.133 -.085.712 1.405 ZRA.TOTAL .118 .030 .194 3.873 .000.616 .209 .136 .488 2.050 (Constant) 4.011 .090 44.566 .000 Industry .015 .021 .027 .688 .492-.028 .038 .024 .755 1.325 FirmOwnership .002 .019 .003 .088 .930.024 .005 .003 .863 1.159 ZOCB.ALT .041 .023 .067 1.796 .073.008 .100 .062 .849 1.178 ZOCB.SPO .039 .025 .065 1.551 .122.397 .086 .054 .681 1.468 ZOCB.CON .057 .022 .094 2.527 .012-.039 -.140 -.087.867 1.153 ZMT.MAN -.020 .024 -.033 -.841 .401.200 -.047 -.029.765 1.307 ZMT.RES .097 .029 .161 3.365 .001.467 .185 .116 .522 1.914 ZMT.GOV .076 .029 .126 2.650 .008.525 .147 .092 .530 1.886 Highly.Integrative .455 .058 .377 7.857 .000.681 .403 .271 .519 1.926 4 Hierarchy.Culture -.252 .107 -.147 -2.361 .019-.434 -.131 -.082.309 3.233 ZRA.TOTAL .184 .046 .305 3.995 .000.616 .218 .138 .205 4.871 zRAxOCB.ALT .006 .024 .010 .263 .792.003 .015 .009 .789 1.267 zRAxOCB.SPO .056 .026 .088 2.197 .029.076 .122 .076 .748 1.337 zRAxOCB.CON .047 .024 .074 1.911 .057.093 .106 .066 .796 1.256 zRAxMT.MAN -.013 .023 -.023 -.563 .574-.193 -.032 -.019.709 1.411 zRAxMT.RES .026 .025 .049 1.027 .305-.169 .057 .035 .526 1.900 zRAxMT.GOVT -.049 .027 -.080 -1.818 .070-.174 -.101 -.063.613 1.631 HighlyXRA -.063 .064 -.060 -.990 .323.455 -.055 -.034.328 3.045 HierarchyXRA -.155 .088 -.124 -1.762 .079.390 -.098 -.061.241 4.142 a.

Dependent Variable: INBOUND.OI HIERARCHICAL REGRESSION – OUT-BOUND OPEN INNOVATION

**Variables Entered/Removed** a **Model Variables Entered Variables** Method **Removed 1** **185**

FirmOwnership, Industry b . Enter 2 ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV b . Enter 3 ZRA.TOTAL b . Enter 4 zRAxOCB.CON, zRAxOCB.SPO, zRAxMT.MAN, zRAxOCB.ALT, zRAxMT.GOVT, zRAxMT.RES, HighlyXRA, HierarchyXRA b . Enter a. Dependent Variable: OUT-BOUND.OI b. All requested variables entered. Model Summary e

**Model R R Square Adjusted R Std. Error of** theChange **Statistics** Durbin-Watson **Square Estimate R Square F Change df1 df2 Sig. F Change Change 1** .098 **a** **57**

.010 .004 .75204 .010 1.617 2 336 .200 2 .482 b .233 .209 .66994 .223 11.926 8 328 .000 3 .506 c .256 .231 .66073 .023 10.203 1 327 .002 4 .537 d .288 .246 .65421 .032 1.819 8 319 .073 1.202 a. Predictors: (Constant), FirmOwnership, Industry b. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV c. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL d. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL, zRAxOCB.CON, zRAxOCB.SPO, zRAxMT.MAN, zRAxOCB.ALT, zRAxMT.GOVT, zRAxMT.RES, HighlyXRA, HierarchyXRA e. Dependent Variable: OUT-BOUND.OI ANOVA a

**Model Sum of Squares df Mean Square F Sig. Regression 1.** **284**

829 2 .915 1.617 .200 b 1 Residual 190.031 336 .566 Total 191.860 338 Regression 44.649 10 4.465 9.948 .000 c 2 Residual 147.211 328 .449 Total 191.860 338 Regression 49.103 11 4.464 10.225 .000 d 3 Residual 142.757 327 .437 Total 191.860 338 Regression 55.330 19 2.912 6.804 .000 e 4 Residual 136.530 319 .428 Total 191.860 338 a. Dependent Variable: OUT-BOUND.OI b. Predictors: (Constant), FirmOwnership, Industry c. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV d. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL e. Predictors: (Constant), FirmOwnership, Industry, ZOCB.CON, Highly.Integrative, ZMT.MAN, ZOCB.ALT, ZOCB.SPO, Hierarchy.Culture, ZMT.RES, ZMT.GOV, ZRA.TOTAL, zRAxOCB.CON, zRAxOCB.SPO, zRAxMT.MAN, zRAxOCB.ALT, zRAxMT.GOVT, zRAxMT.RES, HighlyXRA, HierarchyXRA

**Coefficients a Model Unstandardized Coefficients Standardized Coefficients t Sig. Correlations Collinearity Statistics B Std. Error Beta Zero-order Partial Part Tolerance VIF (Constant)** **62**

4.236 .160 26.511 .000 1 Industry -.054 .037 -.081 -1.462 .145-.090 -.080 -.079.953 1.049 FirmOwnership .025 .035 .039 .706 .481.057 .038 .038 .953 1.049 (Constant) 4.193 .147 28.511 .000 Industry -.089 .036 -.134 -2.466 .014-.090 -.135 -.119.792 1.262 FirmOwnership .050 .032 .078 1.555 .121.057 .086 .075 .928 1.078 ZOCB.ALT .169 .039 .224 4.324 .000.294 .232 .209 .874 1.145 ZOCB.SPO .188 .041 .250 4.565 .000.226 .244 .221 .782 1.278 2 ZOCB.CON .138 .039 .183 3.575 .000.284 .194 .173 .892 1.121 ZMT.MAN -.054 .040 -.072 -1.354 .177-.040 -.075 -.065.835 1.197 ZMT.RES -.135 .047 -.179 -2.898 .004-.070 -.158 -.140.613 1.631 ZMT.GOV -.026 .049 -.034 -.524 .601.031 -.029 -.025.560 1.787 Highly.Integrative .179 .093 .119 1.934 .054.160 .106 .094 .615 1.627 Hierarchy.Culture -.179 .118 -.084 -1.520 .129-.101 -.084 -.074.775 1.290 (Constant) 4.282 .148 28.995 .000 Industry -.098 .036 -.147 -2.731

.007-.090 -.149 -.130.788 1.270 FirmOwnership .037 .032 .058 1.162 .246.057 .064 .055 .913 1.095 ZOCB.ALT .158 .039 .210 4.092 .000.294 .221 .195 .867 1.153 ZOCB.SPO .152 .042 .202 3.605 .000.226 .196 .172 .726 1.377 ZOCB.CON .136 .038 .181 3.583 .000.284 .194 .171 .892 1.121 3 ZMT.MAN -.056 .039 -.074 -1.424 .155-.040 -.079 -.068.835 1.198 ZMT.RES -.178 .048 -.236 -3.717 .000-.070 -.201 -.177.565 1.770 ZMT.GOV -.031 .048 -.041 -.637 .525.031 -.035 -.030.559 1.789 Highly.Integrative .088 .096 .058 .916 .360.160 .051 .044 .560 1.786 Hierarchy.Culture -.068 .121 -.032 -.563 .574-.101 -.031 -.027.712 1.405 ZRA.TOTAL .164 .051 .218 3.194 .002.229 .174 .152 .488 2.050 (Constant) 4.217 .153 27.531 .000 Industry -.095 .036 -.143 -2.627 .009-.090 -.145 -.124.755 1.325 FirmOwnership .045 .032 .070 1.376 .170.057 .077 .065 .863 1.159 ZOCB.ALT .168 .039 .223 4.351 .000.294 .237 .205 .849 1.178 ZOCB.SPO .140 .043 .186 3.245 .001.226 .179 .153 .681 1.468 ZOCB.CON .131 .038 .174 3.421 .001.284 .188 .162 .867 1.153 ZMT.MAN -.046 .041 -.061 -1.129 .260-.040 -.063 -.053.765 1.307 ZMT.RES -.158 .049 -.209 -3.201 .002-.070 -.176 -.151.522 1.914 ZMT.GOV -.031 .049 -.041 -.625 .532.031 -.035 -.030.530 1.886 Highly.Integrative .018 .099 .012 .181 .856.160 .010 .009 .519 1.926 4 Hierarchy.Culture -.136 .182 -.064 -.748 .455-.101 -.042 -.035.309 3.233 ZRA.TOTAL .264 .079 .351 3.367 .001.229 .185 .159 .205 4.871 zRAxOCB.ALT .017 .041 .022 .423 .672.073 .024 .020 .789 1.267 zRAxOCB.SPO .076 .044 .095 1.736 .084.083 .097 .082 .748 1.337 zRAxOCB.CON .021 .041 .027 .507 .613.090 .028 .024 .796 1.256 zRAxMT.MAN .002 .039 .004 .063 .950.040 .004 .003 .709 1.411 zRAxMT.RES .049 .043 .074 1.133 .258.049 .063 .054 .526 1.900 zRAxMT.GOVT .080 .046 .104 1.722 .086.101 .096 .081 .613 1.631 HighlyXRA -.080 .108 -.061 -.736 .462.223 -.041 -.035.328 3.045 HierarchyXRA -.061 .150 -.039 -.407 .684.064 -.023 -.019.241 4.142 a. Dependent Variable: OUT-BOUND.OI NORMALITY, HOMOSCEDASCITY AND LINEARITY Organizational Citizenship Behaviour Organizational Culture Managerial Ties References Abdullah, A. (1992). The influence of ethnic values on managerial practices in Malaysia. Malaysian Management Review, As read in: Yusoff (2011), Organizational Culture and Its Impact on Firm Performance: Case Study of Malaysian Public Listed Companies. International Conference on Management Proceeding. Abulrub, A.H.G., & Lee, J. (2012). Open innovation management: challenges and prospects. Procedia-Social and Behavioral Sciences, 41, 130-138. Acha, V, & Cusmano, L. (2005). Governance and co-ordination of distributed innovation processes: patterns of R&D co-operation in the upstream petroleum industry. Economics of Innovation and New Technology, 14(1-2), 1-21. Ackfeldt, Anna-Lena, & Coote, Leonard V. (2005). A study of organizational citizenship behaviors in a retail setting. 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