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Introduction

Merlin Levirs, Editor-in-Chief

Welcome to the inaugural issue of the International Academic Forum's Journal of Business and Management. Salutations, too, from its governors, editors, and contributors as we submit the earliest stage in the evolution of scholarly discourse on business and management topics expressed through the varied diaspora of Asia's peoples for a global audience. While precision of communication for readers who are unlikely to be native English speakers and of academically rigorous research are non-negotiable requirements for publication, IAFOR-JBM editorship shuns constraining analytical conceptions that organically arise from Asians' distinctive cognitions so as to invoke Asia's voices and perspectives on business and management without obstruction or revision.

Articles contained in this issue were sourced from the Asian Conference on Business and Management 2012. This event attracted 80 delegates, included 70 research presentations, and had 33 proceedings papers submitted. From these, a fraction of top research papers on a range of high-relief topics were chosen for inclusion herein. Said articles were further enhanced for descriptiveness and precision in the communication of the research, and the depth, breadth, and importance of their research and topics. The resulting articles offer an initial taste of the range of topics, height of scholarship, Asia-ready character of linguistic expression, and knowledge of those interested in the future of business and management perspectives arising from the Asian milieu.

The first article, by Timothy Dean Keeley, applies the Global Competency Index (GCI) of Kozai Group to ascertain which personality traits predictively correlate persons' success in undertaking business and management activities in foreign cultures with successful language acquisition characteristics. Proven successful in determining individuals' capability to function as expatriate businesspeople, Keeley determines that capability to perform in foreign languages is likewise shown. His research indicates that the psychological traits for cultural adaptability also operate for linguistic adaptability. He argues for altering self-perception and training regimens to align cross-cultural competencies and cross-cultural communication for overcoming self-constraining sentiments.

In the second article, co-authored by Nashirah Binti Abu Bakar and Kiyoshi Uzaki, Shariah-compliance's underpricing of initial public offerings of Shariah-compliant versus non-Sharia compliant firms is vetted using updated analytical techniques. This begets results that significantly and interestingly diverge from those of others' earlier research on the issue of the impact of Shariah-compliance. The variation in method of reporting between those timeframes accounts for only some of that difference. Looking for the source of the remaining difference, the authors refocus on the role of underwriter reputation for its effect on the evaluation of risk and, so, underpricing in the context of the aforementioned compliance versus non-compliance distinction. They find that risk is the most informative component in Shariah-compliant firms' underpricing at IPO.

The third article presents Merlin Levirs' review of sources of data capable of addressing how constitution of social networks of innovators indicates the effects of

policy change on national innovative capacity. Fitness, methodology, and lack of data sources are identified as constraints to making network research actionable, so builds a case for two sources generating workable and comparable databases. Specific parallels across the highly discrete contexts of these two databases' sources are explored in order to facilitate research between them and to outline the standards by which other potential databases could also fit into a comparative analytical framework.

In the fourth article, Dana Coble and Anshuman Khare co-author a study identifying how small and medium enterprises' (SMEs) capabilities potentially and actually contribute to actions taken against some of the world's most pressing, current threats to sustainability. They stipulate unique characteristics that are typical among SMEs and equip them well for addressing major long-term environmental and socio-economic shortcomings. Embeddedness, integration, and flexibility are chief among SMEs pertinent characteristics. The authors also note how big government's administrative and legal mechanisms fit poorly with various characteristics common among SMEs and they also determine that engagement generally, and in the goal of attaining sustainability, suffers because ill-fitting policy design fails to give them adequate consideration and opportunity to aid in the fight against such threats.

Please note that the IAFOR Journal of Business and Management welcomes the submission of original research papers related to the spectrum of business and management topics from practitioners and academics alike. Manuscripts may be sent even though the authors did not participate in a relevant conference held by IAFOR. Also welcome are book reviews, reviews of literature in the field, and contributions introducing prominent business, management, and applied economics scholars, leaders, and experts. The next issue of the IAFOR Journal of Business and management will also primarily select from papers submitted during the 2013 Asian Conference on Business and Management for its core articles.

All IAFOR publications are available on the website without cost (Open Access). Additionally, no publication fee is charged on authors. Upon acceptance, layout and linguistic guidelines are conveyed to the authors for consideration, final editing, and, if necessary, revision. Again, we thank you for your time and interest in IAFOR's new Journal of Business and Management and invite your return and, if you are interested, contribution to future scholarship published herein.

Understanding the Psychological Traits Affecting Functioning in Foreign Cultures and Performance in Foreign Languages: Application of the Kozai Group's Global Competencies Index

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Abstract

This ground-breaking empirical study involving the application of Kozai Group's Global Competency Index (GCI) with 86 Chinese Students in Japan elucidates the importance of certain personality traits that modulate ability to succeed in business and other goal-oriented activities in foreign cultures and success in performing in oral performance in foreign languages. Fourteen of the 16 GCI dimensions were strong predictors of oral/aural performance in Japanese among the 86 Chinese subjects. The results indicate that the vast majority of the personality traits represented by the GCI, which have been validated in terms of enabling successful cultural adaptation for optimal performance in global business, also facilitate oral/aural performance in foreign languages.

Adaptation to foreign cultures and acquisition of proficiency in foreign languages often prove to be key factors in determining the degree of success in a foreign assignment or long-term cross-cultural business relationship. Kozai Groups GCI has been widely used as a predictor of ability to function in foreign cultures and is especially applicable to screening candidates for long-term assignments abroad. This empirical study demonstrates that the same psychological traits that facilitate cultural adaptation also facilitate performance in foreign languages. This knowledge can form the basis for introspection and training programs for improving cross-cultural competences and cross-cultural communication. The key to understanding the reasons behind the sentiment of the statement "I am just not good at speaking foreign languages" and how to overcome this state of mind is provided.

Introduction

For more than 36 years I have been travelling, study, working and living abroad acquiring new languages at increasingly higher speeds and efficiency to the point that presently I learn a new language every 12 to 18 months on average. In the process of acquiring more than 20 languages for conversation and more than 30 for basic comprehension, I have developed an understanding of the explicit and implicit factors that facilitate the acquisition of foreign languages by observing myself and others. I have always noted that assimilation of a foreign culture in terms of acceptance (not feeling awkward or estranged when functioning in a foreign culture) takes the study of a foreign language beyond meta-linguistic knowledge (conceptual understanding of semantics, grammatical rules, syntax, phonology, etc.) to the level of acquisition enabling a native-like fluency in the target language. In other words, in such a state, it does not feel unnatural to participate in the culture and speak the language. There is no feeling of being a traitor to one's identity associated with one's mother tongue and the culture of one's upbringing. Thus, I hypothesize that the psychological traits that facilitate successful cultural adaptation while working or studying in a foreign culture also facilitate acquiring a foreign language in the terms of high level performance, defined as approximating a native speaker in oral communication.

Previous research on cultural adaptation and foreign language acquisition

Social, psychological, and affective (SPA) factors are important determinants of success or failure in foreign language acquisition (Brown, 1980; Schumann, 1975; Taylor, 1974). Since psychological and affective factors also play an important role in determining success or failure in adapting to and functioning in a foreign cultural environment, many of the SPA factors related to SLA also explain individual differences in cultural adaptation. Schumann's (1986) acculturation model predicts that learners will acquire a target language to the degree they acculturate to the target language group. Schumann (1986: 379) stated: "I also propose that any learner can be placed on a continuum that ranges from social and psychological distance to social psychological proximity with speakers of the target language, and that the learner will acquire the second language only to the degree that he acculturates."

Larsen-Freeman & Long (1991) argue that Schumann did not specify the combinations and levels of social and psychological factors that predict language outcomes, nor did he explain how these factors affect the rate of attainment. This remark shows the excessive demands of strict empiricism, expecting definitiveness where it may not be available. The experiment presented in this research serves to partially address this concern, however, it must be understood that there is no one single recipe for successful foreign language acquisition. The experiment in this research does not attempt to quantitatively verify Schumann's Acculturation Model, but the results do demonstrate that the spirit of the model is very insightful and that any model attempting to explain individual differences will be made more robust by incorporating these culture-language related factors.

According to Dörnyei (2005), inconclusive results in the literature concerning the relationship between psychological traits (personality variables) or SPA and SLA have been partly due to methodological limitations or inconsistencies. The main issues concerning reliable and meaningful results are that: (1) the dependent variable

– measures of individual differences in FLA, and (2) the independent variable(s) – measures of psychological traits (such as personality, attitudes, motivation, etc.) – and (3) the theoretical constructs tying together the measured independent variables.

The dependent variable SLA or foreign language acquisition (FLA) has often been language achievement in terms of academic success in foreign language study measured by such criteria as test scores, grade point average, final degree results, and course-specific evaluations. All these are very indirect measurements of performance in the target language and would not capture the finer points of individual difference in oral/aural performance compared to native speakers of the target language, such as communication competence, accent, pronunciation, naturalness of speech, etcetera. Some studies (e.g. Naiman et al., 1978) that only examined criterion measured from written language found no relationships between these and extraversion-introversion.

There are also problems with consistency: akin to the proverbial comparison of apples and oranges. The issue in this case is whether or not the foreign language learners are sufficiently similar in terms of their relevant background factors (those that would affect FLA performance but are not psychological traits or SPA). More reliable results for the dependent variable under consideration may be obtained by using subjects who have reached a predefined high-level threshold in FLA attainment, such as becoming a student at a university where the target language (TL) is the language of instruction for non-language-related courses, share the same mother tongue, and are controlled for other potentially significant demographic variables. As demonstrated in the analysis of the subjects' demographics in this paper, these factors have been sufficiently considered and accounted for.

As for the independent variables, the approach of this study is to examine factors that have been proven to account for individual differences in successful cultural adaptation. This approach addresses the need for more complex theoretical constructs. MacIntyre, Clément, Dörnyei, and Noels (1998) offer the Willingness to Communicate (WTC) model in which personality comprises an important part of the construct, with four further layers of variables conceptualized between personality traits and communicative behaviour (Dörnyei, 2005:23). However, there is still a need to follow a theoretical construct that takes into consideration that actively functioning in a foreign language usually takes place in a foreign cultural environment. Thus, we must explore which psychological factors facilitate both cultural adaptation and foreign language acquisition.

Measuring psychological traits facilitating cultural adaptation

After reviewing most of the questionnaires that are used to predict people's ability to function effectively in cross-cultural environments, Kozai Group's Global Competencies Index (GCI) was chosen as the most appropriate instrument based on my expertise and experience in the field of cross-cultural management. The Kozai Group kindly agreed to cooperate by offering the free use and analysis of the GCI in the experiment. Thus, the Kozai Group's GCI was employed as a validated instrument for measuring psychological traits affecting cultural adaptation (associated with effective behavior in a cross-cultural environment) to obtain rankings for the experimental subjects in 16 competencies to explore if relatively higher scores

correspond with higher oral/aural performance in a foreign language. The 16 competencies of the GCI are associated with effective intercultural behavior and dynamic global managerial skill acquisition and are grouped under three factors: *Perception Management*, which deals with learning effectively and includes: (1) Nonjudgmentalness, (2) Inquisitiveness, (3) Tolerance for Ambiguity, (4) Cosmopolitanism, and (5) Interest Flexibility; *Relationship Management*, which focuses on managing relationships effectively and is comprised of (6) Relationship Interest, (7) Interpersonal Engagement, (8) Emotional Sensitivity, (9) Self Awareness, and (10) Social Flexibility; and *Self Management*, which explores managing the self in challenging situations and is composed of (11) Optimism, (12) Self Confidence, (13) Self-Identity, (14) Emotional Resilience, (15) Non-Stress Tendency, and (16) Stress Management.

Experimental methods

The GCI was administered to 86 Chinese students studying at Kyushu Sangyo University, where Japanese is the main medium of instruction. These scores functioned as the independent variables. In order to measure the dependent variable, foreign language ability, the 86 subjects participated in videotaped seven-minute semi-structured interviews with a Japanese native speaker who interviewed each of the 86 subjects. Six native speakers of Japanese, with graduate degrees in various fields and ranging in age for 24 to 62, ranked the subjects independently (no consultation with one another) over a period of one month. The evaluation criterion was “how closely the Chinese students sounded like a Japanese native speaker.” The judges were instructed to force-rank the participants’ performance on a 1 (the lowest) to 5 (the highest) Likert scale assigning 18 participants with the score of 5, and the remaining four groups of participants (17 in each group) with rankings of 4, 3, 2, or 1 (18+17+17+17+17=86).

To reduce inter-rater variation the highest value and lowest value were discarded leaving 4 scores. The reliability of the measurement for “Japanese Ability” when using all 86 subjects was 0.594 in terms of average standard deviation as an indication of inter-rate variability, indicating high relatively inter-rater agreement. The reliability of the measurement for “Japanese Ability” when using sub-groups Top 17 and Bottom 17 was 0.315. The average rating of the Top 17 is 4.705 while that of the Bottom 17 was 1.617, yielding an average difference between the two groups of 3.08 in terms of their “Japanese Ability” ratings.

Demographics of subjects

Detailed demographic information about the subjects that might potentially account for differences among the subjects in oral/aural performance (factors other than those measured by the GCI) was gathered and analyzed. The analysis revealed that among all the demographic-related questions, there were only two questions demonstrated a positive significant association with foreign language ability outcomes. Both these questions were related to motivation for learning Japanese.

The mean age of all 86 subjects was 24.31 with a range of 19 to 32 years of age. There was no significant correlation between age and “Japanese Ability” as measured in the experiment (N = 86 Pearson Correlation: 0.116/0.089, Sig. 2-tailed:

0.512/0.415).

In light of the so-called “Critical or Sensitive Period” hypothesis, “Age Started to Study a Foreign Language” (ASSFL) was investigated. The variable ASSFL was created by re-coding the ages: age 9 and below = 4, age 10 ~13 = 3, age 14~17 = 2, and age 19 and above = 1. There is no correlation between the recoded variable and “Japanese Ability” (N = 34/86 Pearson Correlation: -0.018/-0.100, Sig. 2-tailed: 0.919/0.359).

As for gender, there were 30 male subjects (34.9%) and 56 female subjects (65.1%). There was no significant relationship between gender and “Japanese Ability” (N = 34/86 Pearson Correlation: -0.124/-0.045, Sig. 2-tailed: 0.484/0.678). If there were a correlation then a negative number would mean that being male may be an advantage, since Male = 1 and Female = 2.

The relationship between “age came to Japan” and “Japanese Ability” was also explored. There was no significant relationship between “age when came to Japan” and “Japanese Ability” (N = 34/86 Pearson Correlation: 0.089/0.116, Sig. 2-tailed: 0.415/0.512). However, on average the Top 17 came to Japan at a later age than the Bottom 17.

“Months residing in Japan” at the time of the experiment was also recorded and analyzed. There was no significant correlation between “Months residing in Japan” with “Japanese Ability” (N = 34/86 Pearson Correlation: 0.076/0.111, Sig. 2-tailed: 0.668/0.308). The lack of a significant correlation between “Months residing in Japan” and “Japanese Ability” coincides with my expectations. Almost all the subjects have been in Japan for at least 2 years. This is sufficient time for adept language learners to acquire a high level of Japanese, given sufficient motivation. Length of residence tends to decrease in importance as time passes and 2 out of the 7 longest residents (all subjects included) are in the Bottom 17.

The “number of countries visited for at least one week besides Japan” was also noted. The overall majority of the subjects (88.4%) have not been to a foreign country other than Japan. Three of the 10 people who have visited a foreign country besides Japan are in the Top 17 and one is in the Bottom 17 in terms of “Japanese Ability.” Furthermore, only one subject had lived in another foreign country besides Japan (Russia) and that subject lived there for six months. This subject is not in the Top 17 in terms of Japanese Ability.”

The number of languages spoken by the subjects was also analyzed. Though the correlations between “Japanese Ability” and “Numbers of Languages Spoken” are only significant at 0.112 (88%) for the Top/Bottom 17 and 0.074 (92%) for all subjects, in general, the author has experienced that learning languages gets easier as the number of languages spoken increases. One reason for the lack of a significant correlation may be the fact that all the subjects obviously spoke at least 2 languages (Chinese and Japanese) and the number of subjects who spoke 3 languages was only about 25% of the total number of subjects. Note that 35.3% of the Top 17 spoke 3 languages compared to only 1.2% of the total 86 subjects.

The “number of months spent studying in a Japanese language school in Japan” was also investigated. There is not significant correlation among all subjects between months spent studying at a Japanese Language School in Japan with “Japanese Ability” (Pearson Correlations: -0.172, Sig. 2-tailed: 0.112); note that though it is not statistically significant, it is slightly negative. Ironically, overall the subjects in the Top 17 have spent less time in a Japanese Language School in Japan than the subjects in the Bottom 17. This observation suggests autonomous and self-directed language learning may be a factor in determining the degree of success.

A number of questions concerning the students’ motivation were included in the questionnaire. Among these questions, two demonstrated a significant relationship: “I wanted to learn Japanese in order to study at a Japanese University” (N = 34/86 Pearson Correlation: 0.407/0.220, Sig. 2-tailed: 0.017/0.042) and “I wanted to learn Japanese because I like to learn foreign languages” (N = 34/86 Pearson Correlation: 0.444/0.291, Sig. 2-tailed: 0.009/0.007). In addition, ANOVA analysis for the Top/Bottom 17 yielded an F of 10.419 and an F of 2.992 for all 86 subjects. It is interesting to note that enjoying learning foreign languages had the highest significance among all the motivational factors investigated.

The number of hours the subjects watched TV programs in Japanese during their first year in Japan was also noted and analyzed in relation to differences in measured oral/aural Japanese performance. The main difference between the Top 17 compared to the Bottom 17 and all 86 subjects is that the percentage for zero hours and one hour is about half of the other two groups while the percentage for two hours is about double. In considering these results, keep in mind that watching TV in a foreign language, the target language, is challenging and requires persistence and strong motivation to learn. However, this factor was not significantly correlated with “Japanese Ability” (N = 34/86 Pearson Correlation: 0.202/0.174, Sig. 2-tailed: 0.253/0.110).

The self-reported ability in Japanese of the subjects was also analyzed. There is no significant correlation between the subjects’ self-reported “Japanese Ability” when they first came to Japan and their present measured “Japanese Ability” (N = 34/86 Pearson Correlation: - 0.010/0.051, Sig. 2-tailed: 0.956/0.664).

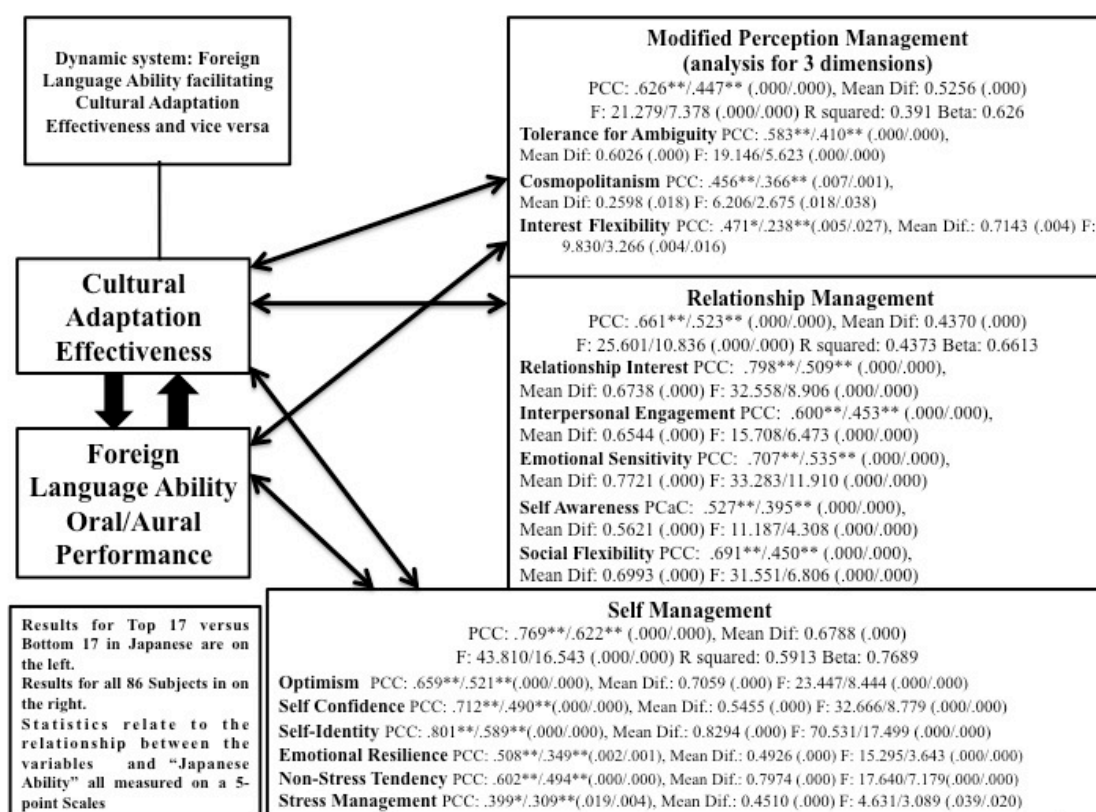
Results of the experiment and model

The results clearly indicate that the GCI as a whole is a very powerful predictor of oral/aural performance in foreign languages. First, the analysis of variance of the GCI scores yielded an F Value of 51.648 (Sig.: = 0.000) for the Top 17 versus the Bottom 17 and an F Value of 16.967 (Sig.: = 0.000) for all five groups. There is a highly significant positive correlation between Overall Global Competency scores and “Japanese Ability” in the case of the Top 17 versus the Bottom 17 (0.779, sig.: 0.000) as well as for all 86 subjects (0.624, sig.: 0.000). Furthermore, the Top 17 subgroup mean score for the Overall Global Competency (3.4687, std. dev.: 0.2812) is significantly greater (0.6412 std. error: 0.0892) than that of the Bottom 17 (2.8275, std. dev.: 0.2248).

Thus, it is clear that the GCI provides an excellent basis for a model for factors facilitating both cultural adaptation and foreign language acquisition in terms of

oral/aural performance. After examining the results of ANOVA, correlations, and differences in the means between the Top 17 and the Bottom 17 for all of the 16 individual competencies that comprise the GCI, two competencies belonging to the *Perception Management* factor, Nonjudgmentalness and Inquisitiveness, were excluded from the model due to a lack of significant results. The resulting model with the ANOVA, correlations, mean differences are given in Figure 1. The results of the regression analysis for each of the three factors (*Perception Management*, *Relationship Management*, and *Self Management*) are also provided.

Figure 1: Model for Factors Facilitating both Cultural Adaptation and Oral/Aural Performance in Foreign Languages



Self-Management factor

Among the three GCI factors, the *Self Management* dimension had the strongest association with foreign language ability. Mendenhall & Oddou (1985) concluded that a domain of variables existed in the cross-cultural adjustment literature that could be categorized as including “activities and attributes that serve to strengthen the expatriate’s self-esteem, self-confidence, and mental hygiene (p. 40).” They labeled this domain, the *Self-Oriented* dimension of intercultural effectiveness. Subsequent reviews of both the global leadership and the expatriate literature support the validity of this dimension as an important contributor to intercultural effectiveness. The *Self Management* dimension takes into account people’s strength of identity and their ability to effectively manage their emotions and stress. To be successful in intercultural situations, it is critical that people have a clear sense of themselves and a

clear understanding of their fundamental values. To be effective in a global context, people must be able to understand, change and adapt appropriately to the foreign work and intercultural environment, yet at the same time, they must also have a stable sense of self in order to remain mentally and emotionally healthy (cited from Kozai Group document).

The competencies that comprise the *Self Management* factor are also important attributes in foreign language acquisition, in particular Self-Identity, which plays an important role in the development of the ability and willingness to mimic native speaker speech patterns, accents, and rhythm. In fact, Self-Identity was the strongest predictor of foreign language ability among all competencies. Language acquisition is also a process of identity construction and how a person sees himself/herself in relation to the language being acquired and to the speakers of that language along with their culture. Wegner (2000: 239) stated, "As identity is not an abstract idea or label, such as a title, and ethnic category, or a personality trait. It is a lived experience of belonging (or not belonging). A strong identity involves deep connections with others through shared histories and experiences, reciprocity, affection, and mutual commitments."

The development of a strong core identity is a critical factor in gaining from the transformative process of acquiring a foreign language and relating to the culture in which it is embedded. My own personal journey in learning languages as well as discussion with others has made me aware of the importance of the transformational experience brought on by the process of acquiring a new language. This transformational experience has been described in various ways in the SLA literature as well.

In "Never Quite a Native Speaker: Accent and Identity in L2 and L1", Nicole Marx (2002) states:

The desire to learn a new language can sometimes be an overwhelming influence on an individual's life. Even where the 'ultimate' acquisition of a foreign language is not essential for survival in a new cultural milieu, participation of any form in the culture and the intentional acquisition of a new linguistic identity can result in a 'seismic mental shift' (Hoffman, 1989:105) in a language learner's understanding and interpretation of the world around him. This is especially pertinent in the case of immigrants and other language learners who are immersed in the new language and culture and who intend to remain in that culture, at least for a significant amount of time."

Relationship Management factor

The *Relationship Management* dimension had the second strongest association with foreign language ability. In their review of the research, Mendenhall & Oddou (1985: 41) concluded that a dimension was warranted that encompassed "the ability to develop long-lasting friendships with host-nationals," due to the fact that this ability "emerged as an important factor in successful overseas adjustment (Abe & Wiseman, 1983; Brein & David, 1971, 1973; Hammer, et. al., 1978; Harris, 1973; Hawes & Kealey, 1981; Ratiu, 1983), accounting for large portions of the variance in the factor analytic studies studying adjustment (Hammer, et. al., 1978; Harris, 1973)." The

ability to create and maintain relationships with individuals in cross-cultural/global settings was found to be a key competency domain. The *GCI* dimension of *Relationship Management* assesses people's orientation toward the importance of relationships in general; how aware they are of others and their interaction styles, values, etc., and the level of awareness they have of themselves and their impact on others. Relationships also become a source of information to help people understand other cultures and may also be a source of social support. The development of positive relationships is a critical aspect of effective intercultural job performance (Harrison & Shaffer, 2005; Mol et. al., 2005). (Cited from Kozai Group Document)

In language acquisition no man is an island and thus the factors comprising the *GCI Relationship Management* domain can play an important role in the foreign language process. Though it is true that language does function as a system of cognitive representation and manipulation within the human mind, most would argue that an equally important role is the social function as a means for communication. In the case of FLA the social aspect is almost always the central goal (rather than the desire to think in a foreign language). The desire to communicate and establish relationships with native speakers of the target language may serve as motivation for learning and facilitate conditions for acquisition.

Perception Management factor

The *GCI* dimension of *Perception Management* examines how people cognitively approach cultural differences. It assesses people's mental flexibility when confronted with cultural differences, their tendency to make rapid judgments about those differences, their ability to manage their perceptions when confronted with situations that differ from what they expect and, finally, it also assesses people's innate interest in, and curiosity about, other cultures. In sum, our perceptions of people who are different from us will ultimately affect what and how we think about them, and very importantly, our behavior toward them (cited from Kozai Group document).

The *GCI* dimension of *Perception Management* also appears to be related to how people cognitively approach a foreign language. People's mental flexibility when confronted with cultural differences also has parallels in their mental flexibility when confronted with different language constructs in relation to syntax, morphology, phonology, etc. Learners' ability to manage their perceptions when confronted with situations that differ from what they expect may be related to how they react when confronting differences between their mother tongue and the language they are seeking to acquire. Interest in, and curiosity about, other cultures is often a trait of people who are enthusiastic about acquiring foreign languages. Actually, such a curiosity is often one of the main motivations for acquiring the foreign language. In sum, our perceptions of people, their language and culture will ultimately affect the degree of motivation we have to acquire the language and interact with them.

Conclusion

The hypothesis that the psychological traits that facilitate cultural adaption and the ability to function in foreign cultures also facilitate foreign language acquisition, particularly in terms of oral/aural performance, has been supported by the results of

this study. This experiment has overcome weaknesses of past studies in terms of having a more accurate measurement of language acquisition by focusing on oral/aural performance of subjects who have all attained a level high enough to allow them to study in the target language. Additionally, multiple demographic and related factors, other than those in the GCI that might account for differences in oral/aural performance were also analyzed and shown not to be significant in the case of this group of subjects. Thus, it is not only possible to use Kozai Group's GCI to screen candidates for cross-cultural assignments in terms of predicting the probability of being able to function well in a cross-cultural environment, but also to predict their success in oral/aural performance in foreign languages if they seek to learn the language in question. This makes the GCI an important tool in the selection and training process when ability in the language of the host county is required.

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The Impact of Underwriter Reputation and Risk Factors on the Degree of Initial Public Offering Underpricing: Evidence from *Shariah*-Compliant Companies

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Abstract

IPO underpricing is an important factor used by investors to predict the profit from investment activities. Numerous empirical researches report the existence of IPO underpricing in various investment environments around the world. However, what the factors that result in such underpricing vary by country and those factors are still largely unexplored. This underpricing phenomenon is difficult to understand because various issues are related such as companies' performance, government policy and economic condition. Thus this paper investigates the average degree of IPO underpricing listed on the Malaysian Stock Exchange (MSE) using data from 476 IPOs that occurred from 2000 to 2011. MSE is a unique stock exchange because it has two types of boards which are the *shariah*-compliant board and the non *shariah*-compliant board. 89 percent of the IPO companies are listed on the *shariah*-compliant board. This paper has two objectives. Firstly, this paper investigates the average degree of IPO underpricing for *shariah*-compliant companies and non *shariah*-compliant companies. Secondly, this paper investigates the impact of underwriter reputation and risk factors on the average degree of IPO underpricing. The results show that the average degree of IPO underpricing for *shariah*-compliant companies is 28.82 percent which is quite similar to that of non *shariah*-compliant companies which is 26.63 percent. Using multiple linear regression analysis this study finds that the IPO underpricing for *shariah*-compliant companies is driven by risk factors.

Keywords: Initial Public Offering (IPO), Underpricing, *Shariah*-compliant companies, Non *shariah*-compliant companies and Malaysian Stock Exchange (MSE).

Introduction

1.1 Background

Selling shares to the general public is an important process for companies to raise capital for the expansion of business. The first instance for a company to sell its shares to the general public on a stock exchange is known as an Initial Public Offering (IPO). According to Taufil Mohd (2004), underpricing refers to the initial return that an investor earns if he buys shares of the IPO at the offer price and sells it at the end of the listing day at the market price. Hutagaol (2005) underpricing refers to the significance increase of the IPO market price over the first few days after the initial listing. Murugesu and Santhapparaj (2009) underpricing refers to the situation where a private company seeking to list its shares on stock exchange at a discount price relative to its true value. This situation makes investors earn a negative return if they were to immediately sell their shares once trading commences.

IPO underpricing is a common phenomenon for stock markets around the world. Studies from Boulton, *et al.*, (2012); Banerjee, *et al.*, (2010); Nguema and Sentis (2006); Agathee, *et al.*, (2012); Darmadi and Gunawan, (2012); Islam, *et al.*, (2010); Samarakoon, (2010); Borges, (2007); Pande and Vaidyanathan, (2007); Chi and Padgett, (2005); Ekkayokkaya and Pengniti, (2012); Yamamoto, (2009)) confirmed the existing of underpricing during initial stock exchange trading. However, the factor that influences IPO underpricing varies across countries and that variation still remains largely unexplored.

The MSE is a unique stock exchange in that it has two types of boards which are *shariah*-compliant board and non *shariah*-compliant board that operate concurrently. At the end of 2011, 89 percent of IPO companies were listed on the *shariah*-compliant board (List of *Shariah*-Compliant Securities, 25 November 2011). *Shariah*-compliant companies have become important participant in the global capital market. This phenomenon was due to the awareness and demand from Muslim people in Malaysia and around the world to participate in the capital market. IPOs for *shariah*-compliant companies have also gathered significant attention in attracting non-Muslim companies and investors to participate. Thus, this paper provides preliminary research on IPO underpricing for *shariah*-compliant companies and non *shariah*-compliant companies listed on the MSE to address two issues. The first issue is whether the average degree of IPO underpricing for *shariah*-compliant companies is higher than non *shariah*-compliant companies. The second issue is associated with the growth of *shariah*-compliant companies in Malaysia. Specifically, this study is different from previous studies regarding IPO underpricing in the Malaysian market. This study investigates the *shariah*-compliant companies with specific emphasis on the impact of underwriter reputation and risk factors on the average degree of IPO underpricing for *shariah*-compliant companies. Underwriters are important in the marketing of IPO shares. When companies seek to make IPOs on the stock exchange, they will choose underwriters who can give good services for marketing IPO shares. An underwriter also plays an important role in determining the offer price and creates a good relationship between issuers and prospective investors during the IPO process. This relationship can attract the investors to buy IPO shares. A study from Carter *et al.* (2010) finds that IPOs marketed by more reputable underwriters are better than those marketed by less reputable ones. A study from Paudyal *et al.* (1998) regarding

underwriter reputation in the Malaysian market found that IPOs underwritten by reputable underwriters are better long term investments as compared to the IPOs underwritten by less reputable ones.

1.2 Fundamental Prohibited Elements in Islamic Finance

Shariah-compliant companies are different from non *shariah*-compliant companies. The main features of *shariah*-compliant companies are that their activities are guided by *shariah* injunctions. IPOs for *shariah*-compliant companies must represent an assertion of religious law where the market should be prohibited from elements such as *riba*, *gharar* and *maysir*.

Prohibition of *Riba*

Riba literally means excess and increase. Technically, *riba* is defined as an increase in any exchange or sale of product or by virtue of loan without providing equivalent value to another party.

Prohibition of *Gharar*

Gharar literally implies risk, uncertainty and hazard. Technically, *gharar* is sales in which the vendor is not in a position to hand over the subject matter to the buyer, whether the subject matter is in existence or not. A contemporary scholar, Sheikh Wahbah Al-Zahaily defined *gharar* in the following term: "A contract which contains a risk to any one of the parties which could lead to his loss of properties." (Islamic Financial System: Principles & Operations, pp.181)

Prohibition of *Maysir*

Gambling (*maysir*) is defined as any activity which involves betting. The winner will take the entire bet and the loser will lose his bet. It means games of pure chance where any party might gain at the expense of the loss of the other party.

1.3 Overview of the IPO Process in Malaysia

The Malaysian Stock Exchange (MSE) was incorporated on 14 December 1976. It has two types of markets which are the main market and the ACE market. The main market was established for companies with a profitable track record for three to five full financial years. ACE was established for high growth and technology companies in order to raise capital. The MSE was provided with two types of boards known as the *shariah*-compliant board and the non *shariah*-compliant board.

The Securities Commission (SC) of Malaysia was established on March 1, 1993. The SC is a self-funding statutory body with focus on capital market regulation in Malaysia. The roles of the SC are to regulate, supervise and systematically develop Malaysia's capital market. In January 1996, the SC liberalized a new method of IPO shares issue on the Malaysian market that is based on a market-based pricing mechanism. The market-based pricing mechanism gave responsibilities to issuers and advisers for setting or making decisions regarding IPO price. Final approval from the SC is still required to ensure appropriateness (How *et al.*, 2007; Abdul Rahim and Yong, 2010). The SC of Malaysia is also leading the development of the Malaysian Islamic capital market established by the Shariah Advisory Council (SAC). The roles of the SAC are to screen or review the companies or stocks in order to ensure fulfillment of the *shariah* requirements for listing shares on the *shariah*-compliant board. Table 1 below explains the IPO listing process on the MSE. These processes

are applied to both boards: *shariah*-compliant and non *shariah*-compliant.

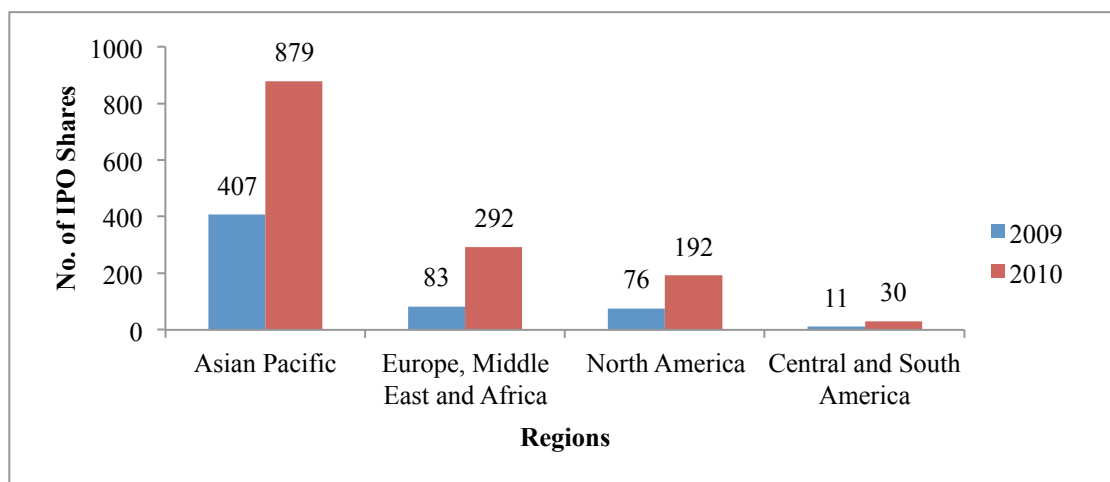
Table 1: IPO Listing Process

No.	Steps	Explanation
1	Appointment of an underwriter	The underwriters are responsible for making submissions of corporate prospectus to SC of Malaysia and MSE.
2	Implementing organizational changes	The underwriters will assess IPO companies' positions in view of listing exercises, such as corporate structure, composition of boards of directors, corporate governance, and internal controls frameworks.
3	Appointing independent directors	All IPO companies are mandated to appoint independent directors so that at least two independent directors or one-third of the members of the board are independent, whichever is higher. An independent director is one who is independent of management and free from any business or other relationship, which could interfere with the exercise of independent judgment or the ability to act in the best interest of a listed company. (Good Governance Guide, No. 5.1)
4	Method of listing and valuation	IPO companies and underwriters need to decide on the method for offering their IPO shares and make valuation of IPO companies based on past earnings in order to forecast the future earnings.
5	Preparing documents for submission	IPO companies and underwriter must prepare a prospectus for submission to the MSE and SC of Malaysia.
6	Submission and review	The review of the application for listing begins after submission of the application document. The prospectus will go through a public exposure period on the SC of Malaysia website for a period 15 market days for public feedback.
7	Approval	After MSE and SC approve the application for listing, they will issue a letter of approval for IPO shares and a letter of approval-in-principle for the prospectus registration.
8	Registration of the prospectus	After receiving on approval letter, IPO companies must register on the MSE.
9	Investor briefings	The offer period begins when the prospectus is issued to the public. During this time, IPO companies need to start a briefing campaign to investors. Briefing campaign activities can include road shows and presentations to investors by the company's directors and promoters.
10	Balloting process	After investor briefings, the balloting of the applications will commence.
11	Listing	The IPO listing process ends by a listing ceremony on the MSE and the trading of IPO shares will commence on this day.

1.4 IPO Shares Issues

Graph 1 shows the IPO shares issued worldwide. The graph indicates an increase of IPO shares issued from 2009 (577 IPOs) to 2010 (1393 IPOs). The Central and South America area's countries have the lowest issue of IPO shares.

Graph 1: IPO Shares Issues around the World

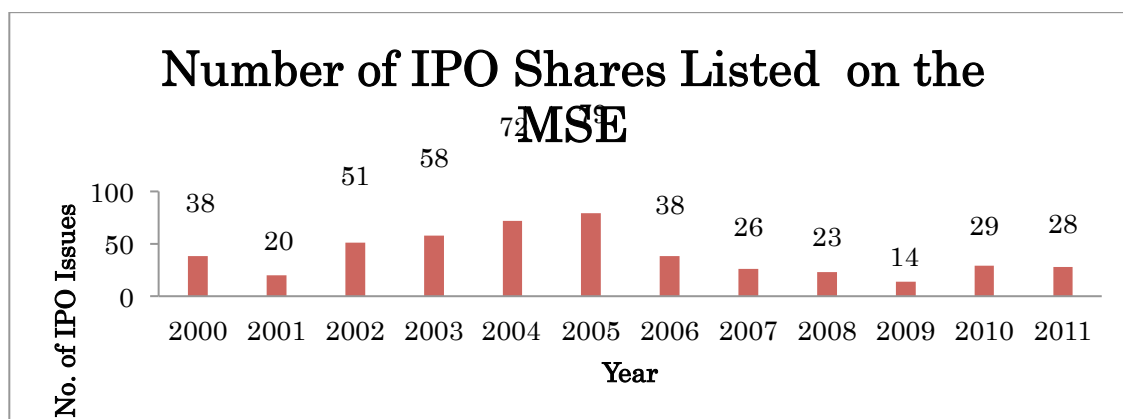


Source: Global IPOs Trend 2011 Report

1.5 IPO Shares Issues in Malaysia

Graph 2 shows the number of IPO share issues in Malaysia from 2000 to 2011. The highest number of IPO share issues occurred in 2005 (79 IPOs) and the lowest number of IPO shares issues occurred in 2009 (14 IPOs). A possible explanation of the low number of IPO issues in 2009 is the sub-prime crisis that happened from 2007 to 2009. This crisis had a negative impact on the issuance of IPO shares in the MSE.

Graph 2: IPO Issues in Malaysia from 2000-2011



Source: Malaysia Stock Exchange

Table 2 shows the *shariah*-compliant companies and non *shariah*-compliant companies listed on the MSE. 420 IPO shares are from *shariah*-compliant companies while 56 are from non *shariah*-compliant companies. It is essential to differentiate *shariah*-compliant companies from non *shariah*-compliant companies because of their different regulatory guidelines. This also helps Muslim investors to differentiate *shariah*-compliant companies from non *shariah*-compliant companies.

Table 2: Number of IPO Shares Issues for *Shariah*-compliant and Non *Shariah*-compliant Companies

Year	<i>Shariah</i>-compliant	Non <i>shariah</i>-sompliant
2000	36	2
2001	20	0
2002	48	3
2003	48	10
2004	60	12
2005	70	9
2006	35	3
2007	22	4
2008	22	1
2009	13	1
2010	23	6
2011	23	5
Total	420	56

Source: Malaysian Stock Exchange (MSE)

1.6 IPO Shares Issues by Types of Industry Listed on the MSE

Table 3 shows IPO share issues by type of industry listed on the MSE from 2000 to 2011. The highest number of IPO shares issues are from companies engaged in industrial production (134 IPOs) followed by the trading and service industry (105 IPOs). The technology industry (99 IPOs) has the third highest number of industry IPO share issues. The lowest numbers of IPO share issues are the Closed and Fund industry (1 IPO) and Special-Purpose Allocation Company industry (1 IPO).

Table 3: Number of IPO Shares Issue in Malaysia from 2000 to 2011 by Type of Industries

Industries	Total (Year 2000-2011)	Percentage (%)
Industrial Products	134	28.15%
Trading/Services	105	22.06%
Technology	99	20.80%
Consumer Product	73	15.34%
Property	19	3.99%
Real Estate Investment Trusts (REITs)	13	2.73%
Construction	11	2.31%
Plantation	9	1.89%
Finance	7	1.47%
Infrastructure Project Cos.	4	0.84%
Close/Fund	1	0.21%
Special Purpose Allocation Company	1	0.21%
TOTAL	476	100.00%

Literature review

2.1 IPO Underpricing

In almost every country, IPOs are underpriced. A study by Islam, Ali, and Ahmad (2010) reports a very high average degree of IPO underpricing in Bangladesh (480.72 percent) for the period 1995 to 2005. In the People's Republic of China, IPO underpricing of 129.16 percent, for the period 1996 to 2000, was reported by Chi and Padgett (2005).

Malaysia has also reported a high average degree of IPO underpricing. The most significant study that measures IPO underpricing in Malaysia is Dowson (1987). IPO data collected from 1978 to 1984 show that IPOs in Malaysia are underpriced at 166.7 percent, compared with Hong Kong's 13.8 percent and Singapore's 39.4 percent. Jelic *et al.* (2001) found that the average presence of IPO underpricing is 99 percent during the period 1980 to 1995. The study from Yong and Isa (2003) found that the average occurrence of IPO underpricing is 94.91 percent over the entire January 1990 to December 1998 period. Murugesu and Santhapparaj (2009) found that IPOs are underpriced at 81 percent from 1999 to 2004. The previous studies regarding IPO underpricing in the Malaysian market reported that the average degree of IPO underpricing is high if compared with the other mature stock markets around the world. This underpricing phenomenon happened in most stock exchanges around the world. Table 4 shows the average degree of IPO underpricing around the world. The highest IPO underpricing is reported in Bangladesh and the lowest in Portugal.

Table 4: Summarizing of IPO Underpricing Around the World

Countries/Region	Period of Study	Average degree of IPO underpricing	Authors
Bangladesh	1995-2005	480.72%	Islam, Ali and Ahmad (2010)
Middle East and North Africa	January 2000-July 2007	184.1%	Chahine and Tohmé (2009)
P.R. of China	1996-2000	129.16%	Chi and Padgett (2005)
Japan	2001-2006	60.21%	Uzaki (2009)
Sri Lanka	1987-2008	34%	Samarakoon (2010)
Thailand	1990-2007	22.99%	Ekkayokkaya and Pengniti (2011)
India	2004-2006	22.62%	Pande and Vaidyanathan (2007)
Indonesia	2003-2011	22.2%	Darmadi and Gunawan (2012)
Singapore	1993-2005	16.5%	Zhang, C. and King, T.H.D. (2008)
Mauritius	1989-2010	13.14%	Agathee, Sannasse and Brooks (2012)
Portugal	1988-2004	11.1%	Borges (2007)

2.2 Underwriter Reputation

Premarket activities undertaken by the underwriter can signal to the public the significant demand for the IPO shares. Most empirical studies find a significant relationship between underwriter reputation and the average degree of IPO underpricing. It shows that an underwriter plays a significant role in determining IPO underpricing performance.

An empirical study conducted by Carter *et al.* (1998) suggested that the underperformance of IPO stocks relative to the market over a three-year holding period is less severe for IPOs handled by more reputable underwriters. Yip *et al.* (2009) found that investors can earn above-market returns by investing in IPOs that are underwritten by leading investment banks and backed by venture capitalists and divest before the expiration of the lockup period. Kirkulak and Davis (2005) investigate underwriter reputation and IPO underpricing for the Japanese IPO market. They find that the relationship between underwriter reputation and IPO underpricing depends on when the IPO is priced, reflecting the level of demand for the issue.

A study from Jones and Swaleheen (2010) show that the underwriter reputation is statistically negatively related to initial return from 1980 to 1991 and statistically positively related to initial returns from 1992 to 2003 in the USA, when underwriter reputation is taken as an exogenous variable. An empirical study from Kenourgios *et al.* (2007) show that underwriter reputation and times of oversubscription significantly affect the average degree of IPO underpricing in Greece.

A study from Neupane and Thapa (2013) regarding underwriter reputation and the underwriter-investor relationship in IPO markets in India found that high reputation and low reputation underwriters have strong relationships with different sets of investors. While large institutional investors participate early in IPOs managed by high reputation underwriters, high net worth investors appear to do the same in IPOs managed by low reputation underwriters. The varying nature of relationships with investors also has important consequences for IPO pricing. The analysis of setting the offer price shows that reputation matters greatly for high reputation underwriters. Low reputation underwriters, on the other hand, appear to price aggressively and set high offer prices even when institutional participation is negligible.

Results from a study by Jelic *et al.* (2001) do not provide evidence that offers underwritten by more prestigious underwriters are better long-term investments as compared to those underwritten by less prestigious underwriters in the Malaysian market.

2.3 Risk Factors

Risk factors involved in evaluating the average degree of IPO underpricing is important in estimating the return to investors. A study by Nguema and Sentis (2006) on 33 countries around the world found that country risk is one of the determining factors of IPO underpricing. Sahoo and Rajib (2011) found that risk and uncertainty have a significant impact on the average degree of IPO underpricing. This study used a sample of 171 IPOs issued in India during the period 2002 to 2007. Agathee *et al.* (2012) examined evidence on the short-term underpricing of IPO shares listed on the Stock Exchange of Mauritius from 1989 to 2010. The average initial return is 13.14%. Using regression analysis, they found that aftermarket risk level and auditor's reputation has a significant positive impact on the average degree of IPO underpricing.

Research methodology

3.1 Sample

The data used in this study is comprised of 420 IPOs for *shariah*-compliant

companies and 56 IPOs for non *shariah*-compliant companies from 2000 to 2011. The data from this study are compiled from the Malaysian Stock Exchange, Prospectuses, the ISI Emerging Market website and listed company websites.

3.2 Data Analysis

To calculate the average degree of IPO underpricing for *shariah*-compliant companies and non *shariah*-compliant companies on the first day trading on the MSE, this study calculated underpricing using the following formula:

$$UP_i = \frac{CP_i - OF_i}{OF_i}$$

Where,

UP_i : underpricing in firm i

CP_i : closing price in firm i

OF_i : offering price in firm i

To quantify the impact of the two explanatory variables on the average rate of IPO underpricing for *shariah*-compliant companies, this study performs a multiple linear regression using the following equation:

$$UP_i = \alpha_i + \beta_1 (UR_i) + \beta_2 (R_i) + \varepsilon_i$$

Where,

UP : underpricing

UR : underwriter reputation

R : risk factors

ε : other factors

Table 5 explains the predictor variables used in this study. The main hypotheses that are tested in this study are underwriter reputation and risk factors. Investors can get good information regarding IPO companies from underwriters during the briefing process. Underwriters play an important role in attracting potential investors. The important factors in investment are risk and return. Risk can be defined as uncertainty of returns that investors earn during the investment process. If the offer price is below the market price, it generated negative return to investors. The main objective of investment is to maximize return and minimize a risk.

Table 5: Explanation of Determinants of IPO Underpricing for *Shariah*-Compliant Companies

Explanatory Variable	Description
UR= Underwriter reputation (dummy variable)	High underwriter reputation: The first and second highest number of IPOs managed by an underwriter during a period of study.
R= Risks factor	Using a method from Abdul Rahim and Yong (2010) this study calculated risk as the reciprocal of the IPO offer price, that is: $risk = \frac{1}{OF_i}$ Where, OF= offering price

The following hypotheses are proposed:

H_0 = Underwriter reputation and risk factors individually have no significant effect on the average degree of IPO underpricing for *shariah*-compliant companies.

H_1 = Underwriter reputation has a significant effect on the average degree of IPO underpricing for *shariah*-compliant companies.

H_2 = Risk factors have a significant effect on the average degree of IPO underpricing for *shariah*-compliant companies.

Results

4.1 Average Degree of IPO Underpricing

In this section, the results are presented in two stages. The first stage is descriptive statistics of the average degree of IPO underpricing for *shariah*-compliant companies and non *shariah*-compliant companies. The results also report the average degree of IPO underpricing for types of industry, for high and low underwriter reputation, and for *shariah*-compliant and non *shariah*-compliant companies. The second stage presents the results of the multiple linear regression analysis on the effect of both underwriter reputation and risk factors on the average degree of IPO underpricing for *shariah*-compliant companies listed on the MSE.

Table 6 shows the descriptive statistics results on the average degree of IPO underpricing for *shariah*-compliant companies and non *shariah*-compliant companies. The average degree of IPO underpricing for *shariah*-compliant companies is 28.82 percent and 26.63 percent for non *shariah*-compliant companies. Therefore, the average degree of IPO underpricing in Malaysia is lower than reported by previous studies. For example, Dawson (1987) report average degree of IPO underpricing at 166.7 percent; Jelic *et al.* (2001), 99 percent; Yong and Isa (2003), 94.91 percent; and Murugesu and Santhanapparaj (2009), 81 percent. This result also suggests that the average degree of IPO underpricing for *shariah*-compliant companies is quite similar with that of non *shariah*-compliant companies. A possible explanation of the decrease in the average degree of IPO underpricing reported in this study is related to the market-based pricing mechanism introduced by the Securities Commission (SC) in 1996. This method is applied for *shariah*-compliant companies and non *shariah*-compliant companies.

Table 6: Average Degree of IPO Underpricing

Company	No. of Companies	Underpricing	Minimum	Maximum	Standard Deviation
<i>Shariah</i> -compliant companies	420	28.82%	-0.45	2.64	0.4551
Non <i>Shariah</i> -compliant companies	56	26.63%	-0.25	2.62	0.5546

Table 7 shows the average degree of IPO underpricing by types of industry. The results from *shariah*-compliant companies show that IPOs are overpriced for infrastructure (-4.12 percent) and finance (-9.60 percent). In contrast, construction (12 percent) and Special Purpose Allocation Company (15 percent) industries are overpriced for non *shariah*-compliant companies. Technology industries (-51.78 percent) tend to have a higher average degree of IPO underpricing for non

shariah-compliant companies compared with *shariah*-compliant companies (-37.71 percent). These results show that technology is a more risky industry for investment due to its high average degree of IPO underpricing.

Table 7: Comparison of Average Degree of IPO Underpricing for *Shariah*-compliant Companies and Non *Shariah*-compliant Companies by Types of Industry

Types of Industry	<i>Shariah</i> -compliant Companies		Non <i>shariah</i> -compliant Companies	
	No. of Companies	Average Degree of IPO Underpricing	No. of Companies	Average Degree of IPO Underpricing
Industry product	127	27.26%	7	34.43%
Trading/service	90	30.87%	15	44.53%
Technology	90	37.71%	9	51.78%
Consumer product	70	26.16%	3	4.33%
Property	17	12.11%	2	-7%
Construction	10	28.63%	1	-12%
Plantation	8	15.08%	1	27%
Infrastructure	4	-4.12%	-	-
Real estate investment trust (REITs)	3	17.07%	10	3.6%
Finance	1	-9.60%	6	13.33%
Special Purpose Allocation Company (SPAC)	-	-	1	-15%
Close/Fund	-	-	1	1%

Table 8 shows the average degree of IPO underpricing for *shariah*-compliant companies for high and low underwriter reputations. The results show that the *shariah*-compliant companies led by high-reputation underwriters tend to be underpriced lower (-25.04 percent) compared with *shariah*-compliant companies led by low-reputation underwriter (-31.68 percent). This finding suggests that IPO for *shariah*-compliant companies managed by high underwriter reputations can decrease the average degree of IPO underpricing. It also suggests that the pre-market service provided by high underwriter reputation, such as road show activities and offer price adjustment, can affect the average degree of IPO underpricing. The results from non *shariah*-compliant companies are different from *shariah*-compliant companies. The average degree of IPO underpricing for high underwriter reputation is 36.08 percent, and that for low underwriter reputation is 17.83 percent. This result shows that IPO for non *shariah*-compliant companies managed by high or low underwriter reputation does not have any impact on the average degree of IPO underpricing.

Table 8: Average Degree of IPO Underpricing for *Shariah*-compliant Companies for High and Low Underwriter Reputation

Underwriter reputation	No of Companies	Underpricing	Minimum	Maximum	Standard Deviation
<i>Shariah</i> -compliant Companies:					
1. High underwriter reputation	181	25.04%	-0.39	1.80	0.36927
2. Low underwriter reputation	239	31.68%	-0.45	2.64	0.50942
Non <i>Shariah</i> -compliant Companies:					
1. High underwriter reputation	27	36.08%	-0.25	2.62	0.64034
2. Low underwriter reputation	29	17.83%	-0.20	1.84	0.45466

Table 9 presents the results of the multiple linear regression estimation. While the risks variable is statistically significant at 0.01 level of significance, underwriter reputation is found to be insignificant. This finding contrasts with several studies on underwriter reputation. The study from Kirkulak and Davis (2005) regarding underwriter reputation in the Japanese IPO market found a significant relationship between underwriter reputation and average degree of IPO underpricing. Jones and Swaleheen (2010) examine the underwriter reputation in the USA from 1980 to 2003. They found that underwriter reputation has a statistically positive significant impact on the average degree of IPO underpricing during the period 1992 to 2003 when underwriter reputation is taken as an exogenous variable. When considering the choice of the high or low reputation underwriter as endogenous to characteristics of the firm, underwriter reputation has a significant positive impact on the average degree of IPO underpricing (for the period 1980 to 2003 and 1992 to 2003) and it has an insignificant impact for the period 1980 to 1991.

Table 9: Results of Multiple Linear Regression Analysis

Variable	Coefficient	t-statistics
Intercept	0.198	(4.430)
Underwriter reputation	-0.029	(-0.638)
Risk	0.066	(3.513)*
R square = 3.4%		
F value = 7.302		
Durbin Watson = 1.664		

* Indicates statistical significance at the 1% level

Conclusion

This paper examines the profiles of IPO underpricing for *shariah*-compliant companies listed on the MSE. This is done by investigating the average degree of IPO underpricing for *shariah*-compliant companies from 2000 to 2011. Overall, this study uses 420 IPOs for *shariah*-compliant companies and 56 IPOs for non *shariah*-compliant companies issued during the period of study. Even though there are many empirical studies regarding IPO underpricing in Malaysia, there are no previous studies that look at the effects of underwriter reputation and risk factors on the average degree of IPO underpricing for *shariah*-compliant companies. This study endeavors to fill this gap.

The preliminary results show that the average degree of IPO underpricing for *shariah*-complaint companies is 28.82 percent and 26.63 percent for non *shariah*-complaint companies. Compared to the average degree of IPO underpricing of 166.7 percent (Dowson, 1987), 99 percent (Jelic *et al.*, 2001), 94.91 percent (Yong and Isa, 2003) and 81 percent (Murugesu and Santhanapparaj, 2009), the average degree of IPO underpricing reported in this study is more similar to those in mature markets. One possible reason that explains the lower percentage of IPO underpricing is revisions of the IPO pricing mechanism by the Securities Commission of Malaysia. This finding is similar to the findings reported in Japan. Pettway and Kaneko (1996) found that removed price limits and introduced public auctions reduced the average degree of IPO underpricing significantly.

Secondly, the results from *shariah*-compliant companies show that IPOs are overpriced for the infrastructure industry (4.12 percent) and the finance industry (9.60 percent). In contrast, construction (12 percent) and Special Purpose Allocation Company (SPAC) (15 percent) industries are overpriced for non *shariah*-compliant companies. Technology industry companies (-51.78 percent) tend to have the highest average degree of IPO underpricing for non *shariah*-compliant companies compared with *shariah*-compliant companies (-37.71 percent). This result suggests that the technology industry is risky industry for investment due to the high average degree of IPO underpricing. The average degree of IPO underpricing for *shariah*-compliant companies led by high underwriter reputation tends to be less underpriced (-25.04 percent) compared with *shariah*-compliant companies led by low underwriter reputation (-31.68 percent). This result suggests that underwriter reputation plays an important role in determining the average degree of IPO underpricing for *shariah*-compliant companies in Malaysia. However, the results from non *shariah*-compliant companies contrast with those from *shariah*-compliant companies. The average degree of IPO underpricing for high underwriter reputation is 36.08 percent, and that for low underwriter reputation is 17.83 percent. This result shows that IPO for non *shariah*-compliant managed by high or low underwriter reputation does not give any impact on the average degree of IPO underpricing.

Finally, the results of the multiple linear regression estimation indicate that IPO underpricing issues by *shariah*-compliant companies are driven by the risk factors. This result is similar to the finding from Sahoo and Rajib (2011) regarding the impact of risk proxies on the average degree of IPO underpricing in India. They found that risk and uncertainty surrounding IPOs have a significant impact on the average degree of IPO underpricing. A possible explanation is the implementation of the new pricing

methods in the Malaysian market. When the IPO companies and underwriters have responsibility in setting offer prices, they try to set suitable offer prices for presumed market prices. This reduces the risk for loss during the initial trading on the stock exchange.

Further research could seek to enlarge the potential determining factors that could be influencing the average degree of IPO underpricing. In addition, the role of regulatory agencies in the Malaysian capital market could be more closely examined, especially in relation to short-term and long-term price performance.

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Innovations Creator Networks: Blind, Quantitative, Longitudinal Databases for Comparison of Pharmaceuticals and Film

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Abstract

Analysis of social networks has added a new useful dimension to developing actionable understanding of innovation processes, particularly for creating policy that effectively supports innovativeness. However, progress is constrained. For instance, reliance on data from sources that reflect properties other than innovation, such as invention, knowledge dissemination, or geographic clustering is faulty. Also, methodologically, reliance on questionnaires, interviews, or case-study observations lack authenticity, comprehensive applicability, or both. Finally, it is constrained by lack of data sources that are authentic to innovation processes, comprehensive industry overviews, sufficiently longitudinal to bridge policy- and economic-impact events, and blind to researcher-subject bias. This report suggests two industries' databases that overcome the aforementioned constraints and are, therefore, offered as subjects for the founding of future blind, comprehensive databases for quantitative social network analysis of innovation processes. It includes how the two databases would best be constructed and suggests several methodological considerations for future research using them, particularly for comparative analysis. Doing so would harden the soft science characteristics and misappraisals presently commonplace in this area of scholarly research. Subsequent research utilizing this approach and material would enable policy metrics that would enhance policies aiming to build better overall national innovation systems.

Introduction

When policy is changed to improve innovation, the metrics make the conclusions, so maximally blind, quantitative, and longitudinal data that tracks the impact of policy change is optimal. Further, the novelties founding innovative products often arise within an interpersonal collective—a social network—that can show policy changes' impacts on potential inventors' interest in inventive networking. Dr. Bart Nooteboom's research mates network analysis to cognitive distance initiated this research area through deduction of firms' managers' perceptions of inter-firm linkages (Nooteboom, 1998) (Nooteboom, 2006), so greater reliance on massive amounts of blind, quantitative, and longitudinal data to develop conclusions without reliance on managers' perceptions would advance this study to nearer optimal. This study introduces the contents of two sets of data that may be amassed for the purposes of blind, quantitative, and longitudinal social network analysis of innovations' creators and discusses what those contents may effectively assess.

Constraints on data availability

2.1 Introduction to Data Availability Constraints

Securing valid and valuable data-sources to assess creative individuals' patterns in networking is constrained by factors limiting the depth and breadth of generalizability. Research into the social networking nodalities of the people who create innovations (inventors, artists) suffers under the twin tyrannies of the questionnaire and invention. Survey respondents represent themselves differently due to interpretation of questions. Invention, lacking corollary of market entry, ignores policy's purpose. Also, firms' innovation management values secrecy, so intellectual property ascribed to products is hidden, inaccessible to researchers, or lacking, and respondents' self-reporting threatens authenticity of ascriptions reported. Thus, to those data that can be compiled into databases that are useful for social network analysis on innovation's inventors and artists are limited to a very few by the above-mentioned tyrannies and varying veracity of subjects' reporting constraining appropriability of findings. Therefore, the comprehensiveness and authenticity of databases of creative persons' characteristics compiled from marketed novel pharmaceutical and film products contents is discussed.

2.2 Depth Constraints from Validity and Value

Generating responses, versus retrieving them, and defining usefulness limit availability of acceptable options for network analysis on innovators.

Questionnaires, which, in interrogators' quest for testable proofs, ascribe quantitative allusions to data that is actually qualitative, influence responses. Respondents intuitively construe questions' interests and modify responses accordingly (Murray, 1999)(Oppenheim, 2000), so allusions in questions beget illusions of independence. To overcome this deficiency, limiting source data to those where the authors' self-characterizations bear as little value to interested parties as is possible and that are made with complete ignorance of researchers' interest is the optimal research instrument.

Invention asks no proof-by-market while a narrow definition of innovation, which is not synonymous with invention, does. Invention that does not go anywhere is not

innovation. Dissemination defines innovation. By innovation's narrow definition, it implies *ad sparsis (at dissemination)* viability, not empty creativity, so recognizably being of social benefit and, consequently, worthy for providing valuable new knowledge for aiding policy management. Notwithstanding valuable case-based tests, which also ask for sources without the capriciousness of subjective underpinnings for source data and without content that is short of to-market validation, the grailacious search for quantitatively derived understanding of creator networking with real-world value adds to that understanding the need be applicable across contrasting industries' creator-networks. The issue here is that research on innovation almost universally counts patents or research and development budgets and expenditures and, so, is focused away from real-world application and the validity that it implies. Measuring marketed innovation, rather than invention, validates research conclusions maximally.

In conclusion to the issue of depth of research as shown by value and validity, overcoming constraints against using social network analysis to penetrate into the social nature of the innovation process extends from two foundations. First, retrieval of uncompromised content, whereby research questions are blind to reported information, assures authenticity of the reported source data. Second, creations are independently proven to be meaningful, wherefore products' entrance into the market after an industry-appropriate measure of attribution has occurred, validates the exclusive technological inventions on which they are founded. Thus, invention- and questionnaire-derived results' limitations are mitigated for social networking analysis with subjects' reportage occurring without their knowledge of research interest and by selecting only those subjects whose knowledge creation has been market-validated. Essentially, to progress, social network analysis needs absolutely quantitative data with the right content target.

2.3 Breadth Constraints against Emergence of Data

Invention and questionnaires limit potential sources by hurting analysis, but two other constraints reduce the availability of useful innovation source material to the public and researchers in the first place. Secrecy and organizational culture discontinuities are one. Another is that people responsible for inventions typically go unnamed. The qualitative failings of reliance on patents (inventions) and questionnaires asks for new sources, while both innovation management's either hiding or not volunteering information curtails opportunities to find useable quantitative data sources for effective statistical analysis.

Publicly available source data is exceptionally rare in the business of innovation. Secrecy, or, at least, opacity, makes possible monopoly rent, the most efficient variety of profit-taking in markets. However, more typical than outright secrecy is where connections between inventions and the resulting products are not labeled, either intentionally, as is concretely demonstrated when "patent pending" is entered on products without identifying the patents' themselves, or through neglect, as when no market value is generated by adding the information, so no notice of specifics of novelty's capital is applied. To demonstrate this aspect of business culture, consider that, for instance, computer hardware designers typically do not offer any list of the patents that exist on the multitude of parts that constitute their finished products. "Intel Inside", the trademarked logo of Intel Corporation, does not explicitly indicate anything about patents from which research can then generate the names of patentees

or assignees, or application and granting dates, priority intellectual property, and geography. Viewing patents from the firm rather than from the product, a search of patents' assignees does not assert that each patent actually found its way into a marketed product. A gap exists that confounds the availability of source data.

Given this, the only way to access a firm's innovation history data would be to contact it directly and be provided access to its internal information that chronicles which patents were utilized in marketed products—effectively, a firm-level case study approach. With patents identified, their content data would be assimilated to complete the innovation information package. This means tracking marketed patents through the United States Patent and Trademark Office (USPTO) database. However, examining different firms' cases of invention and innovation augers a compounding, confounding issue: discontinuities between corporate cultures related to innovation management must result in faulty comparability. This is a fundamental drawback of case studies. They provide exacting accuracy of results that cannot be extrapolated to other organizations. The lessons of Silicon Valley's and Route 128's successes have not proven easily transportable despite intense efforts to borrow from them and despite their networks being far more visible than the inner workings of individual firms' secrecy-shrouded innovation management operations. Whatever meaningful results may be gained by researchers accessing firms' otherwise private contents is lost by the very privacy and resulting uniqueness of individual firms' conditions undermining comparability. Firms effectively compartmentalize based on tacit knowledge informed by business culture and history. Barriers against corporate espionage and those that arise from firms' desire to flex competitive and comparative advantage are intentionally instituted barriers against generalization, standardization, and the comparability that allows judgment of best practices. Just as the reason that “best practices” transport poorly between organizations is that those practices tend to be embedded in an organizational culture that is not present in the firm receiving the transplant, innovation management's firm-specific peculiarities engender a case-by-case expression of research and development results. Forced standardization is the only way around this compartmentalization of results.

Thus, business practices inhibit social network data availability in the two ways outlined above. For one, protecting information asymmetries that arise from their research and development activities adds value by causing and maintaining monopoly positions. Secrecy aids revenue generation. However, even where inventions are intentionally or unintentionally made anonymous, inter-firm comparisons are jeopardized by contrasting corporate operational norms and cultures. For another, innovators are often anonymous, because firms guard their identity and often fail to even identify which patents among their portfolios' accrue in a given product. Consequently, failure of emergence of information on innovations' foundations results from firms' secrecy and peculiarities and their not publicly specifying their marketed products' creative inputs.

2.4 Conclusion to Data Availability Constraints

To conclude this report's examination of data availability for social network analysis of innovation processes for the purpose of aiding assessment of policies' impacts, constraints limit opportunities to find useful information sources upon which social network analysis data can be built. For research to progress in understanding innovators' networking in their creative processes, comparability among the

remaining narrow band of available data is necessary. The purpose of this examination is to expose comparability factors between two examples of innovation that breach the above-mentioned constraints and achieve a level of comparability by force of law and force of market. Those examples are, broadly, drug therapies and film and television productions.

Two applicable and available data sources

3.1 Introduction to Applicable, Available Data Sources

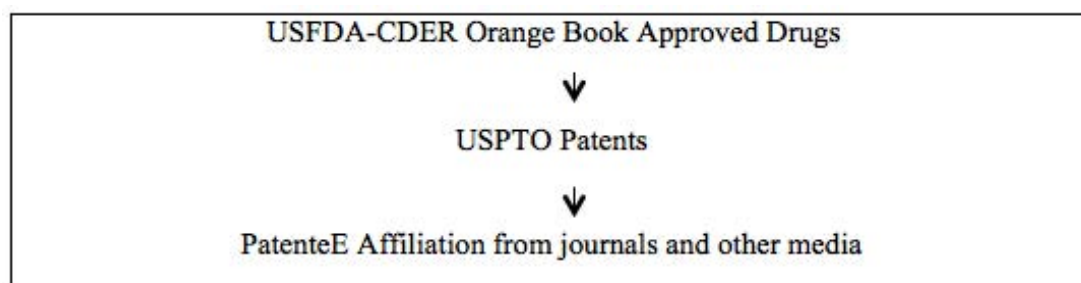
Given the constraints outlined above, the optimal location for sourcing meaningful data on innovators' creators' networks is limited to those that are forced, as by being demanded by law, or custom, as by being demanded by market participants. This paper compares the characteristics of one largely legally enforced source with another that is principally market-driven for disclosure of participants (creative and other). In the United States of America (US), as in other developed economies, bureaucratic transparency in the relatively highly regulated and government subsidized healthcare industry ensures both corruption-inhibiting accountability and a measure of informed consent for full disclosure. This is partially legislated, partly a disclaimer against civil lawsuits, and part corporate constraint against inflated pricing for outsourced, sponsored, or collaborative research through the increasing of fear of litigation, which has been shown to reduce pricing disproportionately heavily among smaller and academic drug researchers (Azoulay, Michigan, and Sampat, 2007)(National Institute for Health Care Management Research and Educational Foundation, 2002). All have legal underpinnings, even if the last mentioned aspect is fundamentally economic in nature. In the entertainment industry, recognition of contributors is customary, but a custom built on commercial considerations. Fame is a marketing tool, so gives studios and distributors a reason to advertise some contributors to their projects, but fame does not explain the extensive lists that follow movies and television programs, though the latter typically offers lists more curtailed than the former. Copyright protections require that copyright holders identify themselves, but copyright law does not ask for the extensive lists either. What does explain the extensiveness of the lists is the nature of employment marketing within the entertainment industry as people and organizations demand to have their names attached to projects for public disclosure. Thus, everyone from stars, directors, and executive-level production staff to walk-on actors, gophers, and caterers demand identification. Furthermore, naming names acts as a payment-in-kind, in lieu of cash, that reduces labor costs. Therefore, law and market provide incentives for identification of contributors to the innovative products of each of the pharmaceuticals and the movie and television entertainment industries.

Force of law and incentives of and for marketing generate exposure of creative individuals in the pharmaceutical and film industries respectively, but other areas deserve discussion of the consideration for entry into this research. In the case of law's sanction, transparency and diffusion of novel content tend to be the determining factors for ensuring public disclosure. In that of visual media, there is a branding effect that augments legal considerations. In effect, the latter is about star-power in the making, where the attachment of famous names to projects generates income. However, legal and contractual considerations provide a foundation of legitimacy for disclosure. Substantially, since both have legal underpinnings, it is noteworthy that the force of law is represented in intellectual property law and the force of custom is

represented in intellectual property's less legally constituted (but generally more important and better reflecting of the reality of the social environment of innovation generation) concept—intellectual capital. Within that context, pharmaceutical therapies offer one legally induced data source and, broadly, copyrighted publications, which includes a variety of entertainment, educational, and even functional (as with software and printed circuit topographies) authorship. Though a level of legal responsibility exists, not all such sources are made accessible to the public and not all meet a complementary level of diligence and inclusiveness of participants in the creative process, particularly since some clearly name more names than can result from legal demands for transparency or tendering of rights. Wholly beyond the realm of legal constraints are a few industries where naming of the people whose creativity is on display is nonetheless publicized. For them, publicity of identifying innovations' creators appears market-induced for purposes of branding, quality-control by assumption of responsibility, and as an instrument for making contact with potential patrons. This group includes, among others, the fashion industry (branding by star-making), entrepreneurship and SME (Small and Medium Enterprise) and, particularly, non-growth professional businesses (mom-and-pop shops, professional service providers, and skilled workers). Thus, other industries are appropriate considerations for inclusion into future social network analysis, though this paper selected only relatively robust sources of data.

3.2 Constructing a Pharmaceutical Innovations' Inventors' Social Networking Database

Table 1: Stepped Construction of the Drugs Database



3.3 Introduction to Pharma Innovations' Creator Database Construction

To complete the innovations' inventors' network database introduced here, it is constructed using two source databases and one broad realm of source information to complete innovators database's contents. The first data source identifies pharmaceutical innovations and their inventions. Those inventions bridge to the second source, which identifies inventors, locations, and timelines. Background on inventors, sourced through academic and professional publications, characterizes inventors' employment. Thus, after constituting the applicable list of inventions from those used in drugs that have been approved for sale in the American market, the location and affiliation of each of the industry's creative personnel forms this full database.

By way of introducing this database compilation for social network analysis of an innovation process, this paper determines that US data on drug development sets the highest standard for comprehensiveness and authenticity. Due diligence suggests

that any effort to develop conclusions using social network analysis of innovators will be aided by accounting for the pharmaceutical industry, owing to its diversity and blind, quantitative, and longitudinal character of its data. Consequently, combining US drug innovations' constituents and timeframe with intellectual property disclosures pertinent to the patenting process, and identification of the inventors' and assignees' geography and population, and determining how prolific and how they are employed builds a real and full database. The following subsections explore expression of those steps toward building a useful database on the innovation process related to drug development.

3.3.1 Approved Drugs

3.3.1.1 Introduction to Approved Drugs Approximating Innovations

Optimally, it is innovations that originate the database. Several considerations connected with authenticity and comprehensiveness of data contents rationalize the use of American listed drugs. The United States Food and Drug Administration's division, the Center for Drug Evaluation and Research, publishes its Orange Book: Approved Drug Products with Therapeutic Equivalence Evaluations: Patent and Exclusivity Information Addendum—Patent and Exclusivity Lists, which catalogues all approved drugs, and the patents upon which each is built, back through those from 1984. Since patents span of enforceability extends over 17 years, this database indicates patents fully from 1984 to present and in numbers that diminish from then to extinction in 1967. Comprehensiveness and authenticity make it optimal.

3.3.1.2 Orange Book

The Orange Book offers comprehensiveness and authenticity. Every drug approved for public consumption is listed, so it offers an opportunity for study of a full population, not just a sample. Its contents truly represent (a) American law, which compels transparency, (b) in excess of 60 percent of university technology transfer office revenues (Cockburn, 2009), and (c) the American drug market, being the largest in the world, attracting all drugs created abroad that pass the US health code. It is the optimal source for comparison of innovation.

3.3.1.3 Alternative Drug Innovation Data Sources

Drug approval sources that are comparably comprehensive and authentic to the USFDA-CDER Orange Book include the European Union's (EU) European Medicines Agency's Committee for Medicinal Products for Human Use/Committee for Medicinal Products for Veterinary Use (EMA-CHMP/CHVP) database and Japan's Ministry of Health, Labor, and Welfare's (MHLW) Pharmaceutical and Medical Devices Agency (PMDA) database. Nevertheless, for reasons of comprehensive scope and several levels of authenticity, given the analytical benefit of contiguity within each national innovation system, though the drug approval for marketing process in each of the three markets is highly similar, the underlying legal frameworks identifying patentees deprives Japan and the EU equal authenticity with American data. Also, since their markets are smaller and, in the case of the EU, more fragmented, any deficiencies of tripartite patent families that exist in the United States of America will only be greater elsewhere. For purposes of comparison between the systems, however, any corner within that triad would be good, given that, collectively, they represent the overwhelming majority of pharmaceutical research and revenues and, when adding in the partners within each of the three domains' trade-group relationships, the North American Free Trade Agreement's zone and the

EU's European Economic Area (EEA) and European Free Trade Association (EFTA) states, the remainder of the worldwide market becomes increasingly discountable. With the rise of economic power in BRIICS countries, the Asian Tiger economies within and without ASEAN, and Mercosur, that discount is declining, but, for the medium-term future, three is most reasonable for purposes of direct comparison of the most important markets that focus on market as opposed to developing markets. Moreover, sampling of triadic patent families in pharmaceuticals by descriptive statistics has shown that practically all pharmaceutical patents are found in at least two of the three patenting indexes and the vast majority are found in all three (Levirs, 2013). For an internally coherent comparison, the USFDA-CDER Orange Book's approvals are optimal for naming innovating inventions.

3.3.1.4 Conclusion to Approved Drugs Approximating Innovations

The Orange Book, then, names each drug by its trade name, designates its active ingredient, indicates dates of application and approval, and lists applicable patents (by USPTO number) and the exclusivity date (which, in the case of drugs affected by additional regulations, such as drugs for pediatric use or other specific medical conditions for which special extensions are provided, the exclusivity deadline is lengthened—6 months in the case of pediatric drugs). Thus, except for comparisons between the three drug approval systems, use of the USFDA-CDER's Orange Book of Approved Drug Products with Therapeutic Equivalence Evaluations offers the most authentic and comprehensive source linking drug innovations with patents for which inventors and assignees may be determined.

3.3.2 Patents

3.3.2.1 Introduction to Patents Approximating Creation

Patents' inventors originate innovations inventions. To formulate a fulsome network analysis of the people whose intellectual capital invents the foundations for the previously outlined innovations requires augmentation of innovations' patent data to discern those inventors' backgrounds. US patents most authentically and comprehensively divulge US-market pharmaceutical innovations' invention and their inventors.

3.3.2.2 Pharmaceutical Patents as Drug Inventions

Within the pharmaceutical industry, patents are effective proxies for inventive activity for several reasons. At the investment end, the costs and risks in research and the approval process are high, while reverse-engineering of new molecular entities (NME) is relatively easier and less serendipitous than is the initial research and development both for scientifically and for the investors, since the initial market entrant develops a new market that the reverse-engineered product can usurp. Regarding markets, that for generic drugs (as of approved drugs lacking exclusivity protections) both conveys a significant erosion of pricing and is often supported by government regulatory authorities and government-affiliated insurance providers in this restrictively regulated industry. Patents provide limited-time protections against erosion of returns on investment. Patenting is critically important to recouping costs and earning returns under the conditions of risk that drug developers face and is effectively universally undertaken in order to safeguard monopoly rents.

3.3.2.3 USPTO Primacy

While the USFDA's being the optimal source for networking data relative to its EU and Japanese counterparts is a nigglingly small advantage, since the three are highly comparable and represent invention within their innovations almost perfectly alike, the underlying patent systems make using US data qualitatively superior. While EU and Japanese patents identify patentees based on the applicants' introduction of the novel idea to each of their jurisdiction, the US Patent and Trademark Office's legal framework demands that all the inventors be included and that their rights over the intellectual property are joint, so an inventor who is not named on a patent, but who can prove his or her inventive involvement, has equal right to market the intellectual property without remittance to the other participants or assignee. Thus, the strength of the US data is that it has legal sanction (and a resultant costly market risk) for the inclusion of all actual inventors. In reality, this would result in an insignificant change in the constitution of patents' inventors, given that drugs typically result from advanced medical research that occurs within a corporate, university, or government-sponsored research organization that has extensive and redundant protocols for documenting the inventive processes in their laboratories, but the actuality does not deny that the underlying legal structure validates American reporting more definitively.

3.3.2.4 Conclusion to Patents Approximating Creation

Patenting, then, is a high value undertaking in the drug development industry and US patents embody specific legal accountability that ensures all inventors are named.

Information on creative activity included in the US Patent and Trademark Office's patents specifies inventors, assignees, and dates. These allow the comparison of entries in the various ways mentioned above and in the discussion below. USPTO patent data, then, names drugs' inventor(s) and assignee(s) and locates them by city and state within the United States of America or by city and region for some European countries, and by city and country for the remainder of the world's people. Additionally, dates are provided for filing and grant of patents. From USPTO database information, geographic distributions, longitudinal or cross-sectional analysis, patentee group size, patentee group composition (as of sex or locality/nationality), and assignee group size, and assignee group composition (as academic or corporate) are available for analysis. Nevertheless, though patentee names are available for assessment, their usefulness requires additional investigation described below.

3.3.3 Affiliations

3.3.3.1 Introduction to Creators' Professional Character

Inventors' natures (type of academic, and academic versus non-academic) and inventive prolificity are available for examination each through a subsequent further step from original research. In this case, given the stipulations of American patent law, designating people as patentees defines them synonymously as inventors. Cross-referencing of inventors names among patents, scholarly articles, and other forms of publication and publicity provide insights that can result in meaningful conclusions on the relationships between those activities and the author(s)' inventing for innovations. While the results would not ascribe statistical causality, they would provide strong indications by correlation.

Regarding how prolific is the inventor and how great is that person's economic impact, much current and legacy scholarly research utilizing patents has developed conclusions based on these features. To a greater or lesser extent, depending on the nature of the research question being asked, the inventors' natures can be discerned from other source material, such as professional networking sites, like LinkedIn and Facebook, or, more confidently, through academic and professional journal and book publications, scholarly and professional presentations, and employment histories. Depending on the research question and the source material, confidence in the accuracy of the representational value of the data will vary, but that confidence can be accounted, statistically, to ensure robust results. Tracking patents' inventors' published histories adds two potentially meaningful layers to the analysis, that of the patentees' characters and that of how prolific they are in inventing and in publishing and practicing their research.

3.3.3.2 Journals, Academic and Professional

Whether published by professional associations or academia, journals and trade magazines offer the most trustworthy statements of contributors' employment affiliations. These include the date of publication, the authors' names and, usually, workplace, and articles' topics and categories. Such scholarly and professional literature corroborates authors' affiliation with confidence. Through specialized search engines Google Scholar Advanced™ and Microsoft Academic Search™, patentees' names are tracked to articles whose authors' names match. Commonplace names risk false-positive misidentifications, so search parameters utilize helpful cues for verification. Firstly, searches are restricted to only medical, chemical, and biological articles. Second, matching USPTO-provided dates, locations, co-patentees, and assignees with comparable assignments in articles' (co-patentees = co-authors, assignees = employer). Where conflicts occur, that with the maximum number and proximity of identifiers shared by the patentees and articles' authors designates the highest parallel and, so, acceptance as the same individual.

How prolific are inventors is also possible to identify by surveying literature. This approach has been well-utilized in testing how inventing correlates with publishing in academic journals and with regional or national economic development. Numerous authors, assessing the impact of the commercialization of academia, show how the new culture of academic entrepreneurship, which includes any potentially commercial activity by academics, including mere patenting, focus on correlations between journal publishing and patenting. Some have focused on academia's impacts (Abrams, Leung, and Stevens, 2009)(Sampat, 2006)(Mowery, Nelson, Sampat, and Ziedonis, 2004)(Mowery, 2005 and 2001)(Owen-Smith, and Powell, 2003)(Pechter, and Kakinuma, 1999) and others on how academia has been affected (Azoulay, Graf Zivin, and Manso, 2011)(Colyvas and Powell, 2007)(Azoulay, Ding, and Stuart, 2006)(Leaf, 2005)(Owen-Smith and Powell, 2001)(Thursby, J, and Thursby M, 2000)(Cockburn, Henderson, and Stern, 1999). Thus, by starting with only patents that led to innovations, rather than all patents, the focused nature of the resulting database that assesses inventor-scholars' academic publishing would be more relevant to real-world applications and impacts than broader studies that do not apply *lex parsimoniae* (Ockham's razor) to innovation.

3.3.3.3 Professional Linking Networks and News Articles

In order to confirm employment-affiliation where no journal article is ascribed to a patentee, professional linking forums and news stories fill the gaps. News reports lack the verifying certitude of journals, but supersede ascribing affiliation-type based on non-publication. News sources include everything from print and digital versions of newspapers and magazines, news releases and disclosures, legal or other, to firms and government agencies, and even to obituaries. Self-reported information sources, like professional networking sites and resumes or curricula vitae, also help make identifications. For example, Linked-In™ provides professional detail and history. Misrepresentation is unlikely to affect content from these sources, since only basic elements, like name and residency are drawn. However, the potential for false-positives, as with like names causing misattribution, asks for secondary corroboration by date, place, and assignee-employer alignment. When academic and professional journals are lacking, then networking and news offer an acceptable fall back source to help identify affiliations.

3.3.3.4 Inventive and Authoring Prolificity

Similar to professional networks and news articles in that the added content comes from outside the core innovations, the USPTO patent database also offers network information. Specifically, though the present research focuses on inventions that induce innovations, many other patents never ultimately contribute to a marketed product. They do not fit the definition of innovation applied herein, but they do offer indications about another facet of the inventors' activities that are at least on par with the importance of the inventors' professional and scholarly research and authorship. This approach has been well-utilized in testing how inventing correlates with publishing in academic journals and with regional or national economic development. The eminent researcher-writer in this research area is Bronwyn Hall in her reporting and calculation of patenting prolificity (Hall, 2013). Certainly, though the present research article has condemned reliance on patents over innovations, to identify relevant creativity, looking across the spectrum of patenting and publishing proclivities does indicate much about the overall innovative environment as it aligns with other trends and considerations that are important to inventors.

3.3.3.5 Absence from Published Literature

Relevant only in attributing inventors to non-academic employment is the lack of any publications. Of course, particularly regarding older or foreign data and, to a lesser extent, people very new to the research field, publications of scholarly researchers employed at government-funded research institutes, universities, or polytechnics or institutes of science and technology, may be unavailable, so extra diligence is needed in tracking such individuals. However, as a rule, publication of scholarly research is the currency of academia. Consequently, no publishing by a given inventor indicates that the person is not an academic, so is near definitively employed for a commercial firm's research and product development. Notwithstanding false positives of (a) age, (b) newness, and (c) non-English decent deserve note.

3.3.3.6 Conclusion to Creators' Professional Character

Thus, the nature of inventors' employment affiliation and how prolific is their inventiveness is available through diligent fact-gathering. A hierarchy of trustworthiness and cross-referencing for information sources that elicit less

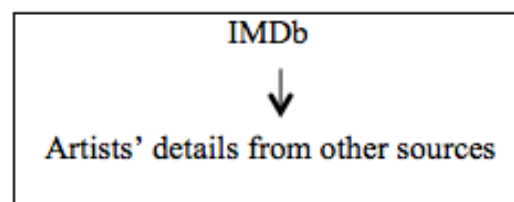
confidence secure the most accurate results possible. Analytical results posit indications by correlation, not ascription of causality.

3.3.4 Conclusion to Pharma Innovations' Creator Database Construction

In summary, by amalgamating quantitative data from the USFDA, USPTO, and published narratives and articles, a wide range of network analysis on innovations' inventors can be garnered. In terms of generating conclusions on the workings of innovator networks, this amalgamated data-source defines one critically important business area, pharmaceuticals, with diverse, quantitative data for statistical analysis. Thus, building this database for social network analysis of inventors that result in innovations is analytically valuable and the more limited exposures of other potential sources of product creator information is most likely to find comparability herein.

3.4 CONSTRUCTING THE MOVIE DATABASE

Table 2: Stepped Construction of the Movie Database



3.4.1 Introduction to Constructing a Movie Database

At the nexus of innovative creativity and well-documented social networks, the amount of work necessary to compile the above-defined drug innovation inventors' database demonstrates how demanding is the process to formulate workable datasets that are capable of generating usefully meaningful conclusions, even when they are available. That few are available in the first place owes to the lack of motivation to disclose that information as when required by law or sought by the marketplace. Publishing is an exception. Publications list authors, artists, and publishers for both reasons, but within the recording subset of publishing, near full disclosure of participants is descriptively detailed for the purpose of marketing. Publishing's subset of well-described innovations' creative population is that of scripted cinematography, scripted television, and lyricized music. An additional, comparable, but unpublished, adherent to this subset's model includes scripted professional theatrical productions, as they tend to be well-documented. However, though databases of scripted entertainment abound and are readily and freely available or can be accessed for relatively nominal fees, few are sufficiently comprehensive as to function effectively for social network analysis. The Internet Movie Database (IMDb), together with its for-pay service IMDbPro™, by contrast, is broadly, deeply, and diversely informed. In some aspects, it is better informed than even the fully compiled drug database chronicled previously. In it, creative individuals' roles are designated and projects' revenues are reported. Drug inventors' roles and contributions are indistinguishable in its data sources and revenue generated by individual drug products is not publicly disclosed. Further, any that could be stated would not be comparable across firm boundaries due to inconsistencies in corporate cultures and accounting. In other ways, IMDb is less fulfilling, like its lack of geographic location of the individuals and the distracting effect of talent agency

locations. Further, the nature of creativity occurring in film, television, theatre, and music production makes illusive determining which tasks are definitively creative. However, a massive amount of categorized and standardized background information is aggregated, if not in a uniform structure. IMDb offers deep, broad, and robust information on movie, television, and music innovations' creators in ways that allow for comparison with drug innovations' creators.

The Internet Movie Database is a comprehensive listing of cinematographic and television productions with sufficient designation and description of the creative people involved in each that sophisticated quantitative social network analysis is feasible, authentic, and valuable. While nominally a movie database, it also includes a non-cinema entertainment format—television. Furthermore, almost all innovation data is self-contained within IMDb, whereas USFDA-CDER and USPTO data sources were needed to furnish its preliminary contents, so little augmentation with additional sources' data is needed to bring the new database's compiled content in line with that provided for drug innovations. Adding information about professional-geographical base, which, given film's global production, is more important than people's choice of abode, is an example of an additional point that needs be sourced externally. Identity and location of agents is a significant additional factor, too, which needs to be sourced from other media. However, where academic research is relevant to drug research and development, it is not for film. Also, IMDb provides some types of information that are unavailable through pharmaceutical sources, such as revenue generated in release and from ancillary sources. Unlike drugs, however, for film and television, the type of intellectual property protection employed, which is copyrighting, does not designate the intellectual property's core inventive contributors. Finally, both databases register products protected by intellectual property legislation: patents for drugs and copyright for film and television products. Consequently, by sourcing the bulk of innovations' social networking from the Internet Movie Database and augmenting it with publicly available components to add peripherals significant to social network analysis (such as a proxy for the inventive phase, such as the start or end date of principal photography), creative artists and the producer-owners of their projects' geography, population within projects, networking societies across successive projects, prolificity, and professional capacity in which individuals are employed are all present for independent assessment and comparison. The following paragraphs itemize expression of those steps toward building a useful social networking database to assess the innovation process associated with film and television productions with a view toward discerning parallels with social network analysis of databases on other industries, such as the pharmaceuticals one outlined above.

3.4.2 Artists and Innovation Designated by IMDb

The content and format of the Internet Movie Database is a variety of professional networking site, somewhat comparable to LinkedIn, but with a view to raising public awareness in the film and television industries, which rely on publicity. Resulting from this, in production and distribution, the inclusion of information as self-reported by the personalities and professionals themselves, making IMDb akin to a résumé. Indeed, the site was introduced as a subscription service for résumés (Wikipedia, retrieved 2014). As such, credibility and accuracy are implicitly questionable (more so than is the case for patent documents, wherein the individuals are equally free to misrepresent themselves, though there may be less of an economic impetus

driving misrepresentations). Misrepresentation is reduced for this research by its sourcing from movies, which are self-reported by the movies' production studios, not the artists, so content portrays the firms' interests, which are not advanced by misrepresentation of artists. Structurally, the data is compartmentalized as a lattice between the people and organizations/firms and films or television programs, but is provided in linear fashion in each, so requires transcription, much as is needed with USFDA and USPTO contents. It is incumbent upon the researcher to define creativity such that the strongest statistical effect possible forms. Optimally, once the statistical test is determined, testing a variety of data inputs by the statistical parameters of invention will indicate the strength of that relationship, thereby enabling a quantitative determiner of novelty. With patents, the novelty determination is implicit in the review and granting process. This is because law designates that an inventor had some role in the inventive process that lead to the invention in question. With copyrights, no direct identification of all the critical creative individuals associated with the project is given, so the names provided in IMDb mix explicitly and implicitly creative personalities with mere laboring professionals and workers. No designation is provided to differentiate the two and, perhaps, none is possible.

3.4.2.1 Defining Creativity

In determining categories of creativity on order with patenting, consider a thought experiment that stipulates to the difficulty in determining whether an individual is creative or not. This question is jejune, since, arguably, most tasks involve some level of creativity, but few are germinal of innovations on order with intellectual capital, let alone intellectual property.

3.4.2.2 Screenwriters

Writers are paid to create and are highly likely to be released from service and have their reputations besmirched if they fail to provide creative content to their projects, regardless of whether their element of the writing is eventually edited out of the final product. The writer writes and writing is definitively creative.

3.4.2.3 Actors and Actresses

Actors, in contrast to screenwriters, are less clearly artistic. Surely, actors bring their own takes on a particular script, but that does not necessarily differentiate the actor from a factory worker or farmer whose job is similarly defined and structured with tasks that effectively are scripted, but demand some creative problem-solving and nuance. Furthermore, different grades of actor occur in scripts whereby headliners' roles typically enjoy dynamic character arcs. At the opposite extreme, "extras" are props. Broadly, supporting actors' roles tend to be purposefully non-creative so that the main characters' arcs display in vivid relief. Thus, actors' creativity is defined separately from the title of actor, yet the separation between main and supporting actors is not consistently defined or recorded in IMDb.

Discerning a method to determine their separation is at researchers' discretion, but that choice inevitably impacts the results of statistical analysis considerably. Other professional tasks also lay between the creativity of the writer and the least dynamic of actors, but simple placement within a creative continuum is problematic, since qualitative dissimilarities and discontinuities are commonplace.

3.4.2.4 Editors

Editing requires a keen and artistic vision (and one can draw parallels to a drug researcher who adds to the realization of a new molecular entity by subtracting problematic input rather than actually adding insights), but that role may only be deemed creative by clarifying that subtracting and selecting from among content provided is a creative act. By that definition, workers watching production lines to remove faulty product, like inspectors examining eggs to remove those that are damaged, deformed, or otherwise unmarketable, would be creators. Certainly, film editing and egg inspection have distinctly different creative input, but that difference is quantitative, not qualitative, so researchers' characterizations and specifications become critical.

Optimally, again, researchers would be able to remove definitional determination from subjectivity by utilizing statistical assessment of correlation to see which professional definitions most significantly correlate with innovation. That effort would be required to retain the objectivity of conclusions.

3.4.2.5 Professional Roles for Testing for Innovativeness

Though the Internet Movie Database, and industry as a whole, lacks a standardized format and definition of roles, professional differentiation makes for a fairly high order of comparability across product entries. Furthermore, it is only at the extremities of film and television production that job characteristics grow diverse. Directors are almost universally common throughout the medium. IMDb lists of professions include, but are not exclusive to, the following nearly thirty categories: Director(s), Writer(s), Cast (often subdivided into classes), Producer(s), Composer(s)/Music, Cinematographer(s), Film Editor(s), Casting, Production Design, Art Direction, Set Decoration, Costume Design, Make-up, Production Management, Second Unit Director or Assistant Director, Art Department, Sound Department, Special Effects, Visual Effects, Stunts, Camera and Electrical Department, Animation Department, Casting Department, Costume and Wardrobe Department, Editorial Department, Music Department, and Other crew. Which of them are essential to the creative content of the production is determined by researchers' definitions—a circumstance that contradicts objective blindness. Clearly, parameters for defining creativity require some rationalization. Notwithstanding what was previously suggested as an objective way to determine that definition (using statistical tools), another valid method is to extrapolate from other successful social network databases' analyses. The danger in that approach is that it may result in one industry's characteristics imposing invalid constraints on another. The task of defining creative roles is paramount, but fraught with challenges that largely result from blind quantitative social networking analysis being new.

3.4.3 Globalization

International data on IMDb is incongruous with that in the drug database, because, while the world's pharmaceuticals are patented throughout the tripartite family of intellectual property systems and has long accessed markets globally, films and television programs are much less broadly applied. Films produced outside of English-speaking countries, owing to language constraints, tend to find market acceptance beyond their language group problematic. Any drug that can enter the United States' market will do so, due to the scale of the American market and because human bodies' are sufficiently common for pharmaceuticals to translate universally.

Only safety concerns restrain some by their not being approved for sale in the US. Foreign films have a different order of constraint to entering the American market and their budgets are more marginal and the entertainment market is much more unpredictable than is the pharmaceutical market. Thus, drug innovation for the US market is tantamount to the world market while, for film and television, foreign-language, subtitled, and dubbed viewing is restrictive. This is partly because the market for entertainment products produced and delivered within the particular country or countries within like-language groups are well-represented. The English-language markets are highly saturated with English-language programming. Meanwhile, due to the adaptability of Anglo-American film and television in particular (an adaptability that is largely augered by their respective scales, scopes, and quality), English-language sourced film and television is the world's most profitably global. This incompatibility of comparison between drugs and film constrains comparative analysis between the two and suggests limiting comparison to English-language countries' source data.

3.4.4 Conclusion to Constructing a Movie Database

To conclude on the Internet Movie Database as a source for film and television production innovations, it is well-positioned by its comprehensive and authentic enumerations to provide inputs for network analysis of its creative personalities for comparison with innovation processes in other industries. While its overall detail is an advantage over alternative industries as sources of data, one deficit is that creative roles are not distinguished from non-creative ones. Doing one's job does not necessarily make a person creative, even when the industry's aim is to repeatedly create novel content. Thus, by one of arbitrary judgment, adapting the definitions of another creative industry to this one, or utilizing statistical tools to evaluate relative capability to generate novelty, the researcher provides a definitive framework for selecting those roles that are to be deemed creative must precede and inform comparison.

3.4.5 Artists' Details from Other Sources

3.4.5.1 Introduction on Other Sources' Details

While the details included in the Internet Movie Database are extensive and those within IMBdPro are more so, two critical points of information that are found within the tripartite drug innovation data and are important dimensions for understanding innovations' inventors' social networking patterns are only possible to source outside IMBd. These are the critical dates in films' innovation process and the locations of filming and of the people and organizations involved in movie production.

3.4.5.2 Sources

Deriving dates and learning locations must be earned by diligence, since no single source readily provides that data across the range of movies included for analysis. Thus, due to their wide-ranging and efficient gleaning of content relevant to key-word parameters, internet search engines function optimally for finding the desired information. This is done by inserting films' titles, institutions' names, or creators' professional names into online searches and augmenting those identities with key indicator-words to indicate date or industry-specific terminology for the desired time-reference, like "pre-production", "principal photography", "post-production", "soundstage" or "on location". Sleuthing across the resultant range of hits will divulge locations and dates associated with the specific filmmaking processes.

However, given the above-stated problems with location, particularly the potential for plurality, double-indemnification to verify accuracy ensures maximal validity of results. Academic-quality research surely demands on a high order of verification. Plurality of locations must be given appropriate attribution, also, as by economic logic or standard accepted practice. Where drugs' verifications offered a range of trustworthiness from academic journals down to news stories, film's verifications lack consistency or pervasiveness in the top order of verifying media, so must rely on professional, self-reporting options. The moral hazard inherent in this reliance on lower-quality information sources must be endured and is a good reason for demanding an increase in the quantity of data included in the research to ensure that aberrations are minimized by increased numbers. As for location, a hierarchy of trustworthiness is absent. The only sources available are self-reporting and news stories, which typically result from press releases, so are tantamount to self-reporting, too. Nevertheless, there is little to be gained from misrepresentation of date and location, so any problems tend to come from the differing interpretations the reporter has of location and, particularly, timing. Looseness of definitions, and the lack of commonality in resulting responses, are addressed by increasing the sample size, which is not a problem due to the enormous number of films available. Further, where multiple different responses may be available, it is incumbent on the researcher to validate the location and dates across several reports. Therefore, the internet provides the desired locational and temporal background information from a diverse range of sources, but the vagaries of imprecise and contradicting reports is overcome through expanding the scope (different types) and scale (number) of those sources.

3.4.5.3 Principal Photography

Just as with drug discovery, many alternatives present themselves as potential representations of the innovation process' beginning. Consistency and rationalization to real-world decision-making by the creative protagonists of innovation are the two principal determiners of which start is the optimal proxy for dating that process.

To explain the analytical framework in relation to the industry against which to measure film, for drug innovation, patent application, patent granting, drug application, drug approval, and approval's publication date are all options. However, in consideration of the speed of the innovation process, the duration between patents' application and grant and between either of those patent events and a drug's approval are the optimal options for affixing dates and durations. Of patents' application and granting, the latter option is most consistent choice given that it is the definitive end of the inventive process, since, at that endpoint, all patents are equal. At the application point, all inventions are not necessarily at the same point and, indeed, are unlikely to be as comparable among the various creative ideas that enter the process. However, the endpoint is one of legal acceptance of completeness. Any further additions or revisions are attributed to subsequent patenting events for separate, new patents. To compare benefits from this knowledge on how the comparable industry's contents are determined.

Film offers a similarly diverse range of start and end dates. Purchase of story rights, pre-production, scriptwriting, principal photography, post-production, marketing, and release are all parts of the process of innovation that produces individual motion picture products. Most of these also have start and end dates, though some of them,

such as marketing and release, typically have staggered beginning and end dates to undertake worldwide rollouts in manageable stages. Among these, only release dates are available through IMBd. Many of the remainder are plagued with inconsistency that arises from many forms of unpredictability. One example is that many projects do not rely on the purchase of story rights. Another inconsistency is that marketing is highly diverse in scale, scope, and nature. A further juxtaposition comes from reporting by standards and definitions that differ widely. Date of purchase of a story often goes unreported, for instance. Finally, the reality of some elements is that the onset and conclusion of a portion of the innovative process occurs slowly and often overlap with previous and subsequent stages, which leads to erratic and subjective representations of when one stage begins and when it concludes. Among these, then, owing to the precision of its definition and its widespread disclosure, principal photography offers the most common measures, the initiation and completion of principal photography is most consistent and logical. It is the time period when the core creative process is realized. Owing to costs, timeframes exist under a common rationality (that time is money), which accommodates comparison well. Owing to demands for marketing and for insurance and capital-servicing reasons, the timing and duration of principal photography is typically publicized and its length minimized under budgetary constraints. Unlike patents' application dates' inconsistency, principal photography's start and finish are equally trustworthy and indicative of consistent time references. Thus, for its availability, logical rationality, and consistency of and among reports, the time of principal photography is the optimal selection among films' innovation process stages.

3.4.5.4 Location

As with dating, locating a production, institution, or person is a complex act and not often divulged within the Internet Movie Database. Additionally, the placement of any of those three appears to be rather irrelevant to the innovative process as the following thought experiments indicate. Though Hollywood remains the iconic center of English-language film production, placement there or elsewhere offers no contest about the innovativeness of the film project, particularly when contrasted with "on location" shoots. Neither is expressly differently innovative than the other based on its location. Similarly, where a creative individual comes from does not carry significance in an industry where relocation for work is as ordinary as following the films' placement. Different, though, is the location of institutions, such as talent agencies, production and marketing firms, and professional organizations. These do tend to cluster in film-making centers, but tend to cope with abbreviated scope by expanding scale. Agencies will have offices in many cities with active film production and send their representatives elsewhere expediently. However, in the interest of discerning national innovation system policies' impact and other geographic effects and to discern what is not understood or misunderstood, location is worthy of full consideration and examination.

3.4.5.5 Conclusion on Other Sources' Details

Summarizing, then, accessing content that informs on the location and timeframe of films, their firms and professions, and their creative personalities, requires casting a wide net, diligently searching through the options, and verifying input through multiple and varied sources.

3.4.6 Conclusion

Finally, the Internet Movie Database is a data source that, for the scripted visual recordings industries of film and television, accepts blind, comprehensive, and longitudinal analysis by including both innovative creativity and well-documented social networks. Though a singular database, parsing relevant data from its individual sources is time-consuming because of the compounding effects of the large number of individual characteristics requiring inclusion and the number of people to be characterized, which is, in total, 4.2 million professionals (IMDbPro, retrieved 2014). By contrast, drug data allots only near 14,000 person-patents (Levirs, 2013). That is to say that, even when people with multiple patents are represented multiple times, the total number of discrete entries is less than twenty percent that of the number of individuals (not multiplied by multiple roles) in IMDb. Many multiples of the effort needed to compile the drug database as a population is required for visual and performing artists in film and television. Certainly for explorative statistical analysis, such as determining which professions are inventive, statistical analysis by sampling is highly appropriate. Efforts to formulate a database of the whole population would be cumbersome and unnecessary, given that the statistically significant number of entries is easily accessible and conclusions from that analysis hold a proven rate of confidence. To summarize and conclude, IMDb offers deep, broad, and robust information on movie, television, and music innovations' creators in ways that allow for comparison with drug innovations' creators.

3.5 COMPARISON OF DATABASES' CONTENTS

3.5.1 Introduction on Comparing Data Content

While the two industries are resoundingly different in structure and product, both are innovative and the reporting of their innovations offer many similarities from which comparison gains its traction. The table below outlines points where comparability can be deduced or induced for blind, quantitative data extrapolation. Induction is needed where no direct reportage of the given content-point is directly provided by a single source, so requires being developed across multiple sources. From these parallel descriptions of available content, the reader is provided a list of possible tractable points for comparison for future research, though any future research will need to verify that comparable features and parameters suggested herein are verified, statistically or logically, to ensure that whatever comparisons follow represent real commonalities. At its bottom, numerous features that are present and are sources of blind, quantitative data within the IMDb data source, but which lack a parallel disclosure in patent-related data, are offered. Partly this is done to satisfy comprehensive disclosure herein, but also to notify the reader of other potential points of contact for future research that either finds additional comparable data features in pharmaceutical innovation data or finds and develops a data source other than pharmaceuticals. As such, the following is as comprehensive a list of blind, quantitative innovation data for the two industries as was available at the time of this report's writing.

3.5.2 Comparable Content

Table 1: Identifiers and Quantifiable Data

From 3 Sources on Drugs:	From IMDb on Film:
Drug's Commercial Name;	Film/Program's Name (by country or region)
Drug's Active Ingredient's Name	
Patentee's Name	Full Cast and Crew* (likely candidates: director(s), writer(s), cast, composer(s), cinematographer(s), film editor(s), production design, art direction, costume design, make-up, second unit director or assistant director, art department, sound department, special effects, visual effects, animation department, editorial department, and music department)
Assignee's Name	Company Credits (production companies, distributors, special effects subcontractors, other)
Inventor's Name as Found in Verification Data	Full Cast and Crew* (likely candidates: director(s), writer(s), cast, composer(s), cinematographer(s), film editor(s), production design, art direction, costume design, make-up, second unit director or assistant director, art department, sound department, special effects, visual effects, animation department, editorial department, and music department)
Assignee's Name as Found in Verification Data	Copyright Holder*
Patentee's Verification Source Reference	IMDb Self-reference
Assignee's Verification Source Reference	IMDb Self-reference
Patent Number	Title, Working Title(s)
Date: Patent Granting	Online Search (key words to determine end of principal photography (between pre-production and post-production)): film's/program's title + "principal photography" or "filmography" or both
Date: Patent Application	Online Search (key words to find <u>start</u> of principal photography (between pre-production and post-production)): film's/program's title + "principal photography" or "filmography" or both, or (key words to find <u>end</u> of principal photography (between pre-production and post-production)): film's/program's title + "principal photography" or "filmography" or both
Date: Patent Expiration	

Date: Drug Approval	Festival*, Limited*, and/or General Release*
Patentee's City and Residence	IMDb: Artist's Page
Assignee's City and Residence	Country, Copyright Holder*, Filming Locations
Patentee's Sex (suggested by name, confirmed by non-USFDA/USPTO search)	Artist's Sex (suggested by name, confirmed by IMDb & other searches)
Number of Patentees	Number of Creative Cast & Crew* (likely candidates/segmented by job title): director(s), writer(s), cast, composer(s), cinematographer(s), film editor(s), production design, art direction, costume design, make-up, second unit director or assistant director, art department, sound department, special effects, visual effects, animation department, editorial department, and music department
Number of Academic Patentees	
Number of Assignees	Copyright Holder*
Number of Academic Assignees	
	Festival Release
	Limited Release (by country or region)
	General Release (by country)
	Technical Specifications (runtime, sound mix, color/bw, aspect ratio, camera, laboratory, negative format, cinematographic process, printed film format)
	Full Cast and Crew (Director(s), Writer(s), Cast (often subdivided into classes), Producer(s), Composer(s)/Music, Cinematographer(s), Film Editor(s), Casting, Production Design, Art Direction, Set Decoration, Costume Design, Make-up, Production Management, Second Unit Director or Assistant Director, Art Department, Sound Department, Special Effects, Visual Effects, Stunts, Camera and Electrical Department, Animation Department, Casting Department, Costume and Wardrobe Department, Editorial Department, Music Department, and Other crew)
	Box Office Receipts (budget, gross revenues, weekend gross revenues, admissions, rentals, copyright holder)
	Ratings (demographic, and age/sex/top/US-nonUS voters)
	Awards
	IMDb Charts
	Soundtracks

Genre

Motion Pictures Association Classification, Certification

Motion Pictures Association of America Number

Runtime

Language

* Subset within larger category or combines several categories

* Discard non-English source data (because non-English film is not comparable—language constraint)

* Discard television source data (because its creative process is not comparable—ongoing and short)

(Levirs, 2013)(IMDb, retrieved 2014)

3.5.3 Conclusion on Comparing Data Content

Thus, as the above table of comparable features between drug and film innovations' inventions' creators, commonalities are numerous. In total, eighteen comparable features that satisfy the demand for the data being blind and being quantitative are present. Film contents are more diverse when representing professions and specializations among the members of potential groups, but these categorizations of the people do not automatically disqualify any one group from contention as representatives of creativity that results in innovative products and without which the innovative product would not be possible. While the two industries are resoundingly different in structure and product, both are innovative and the reporting of their innovations offer many similarities from which comparison gains its traction. The table below outlines points where comparability can be deduced or induced for blind, quantitative data extrapolation. Induction is needed where no direct reportage of the given content-point is directly provided by a single source, so requires being developed across multiple sources. From these parallel descriptions of available content, the reader is provided a list of possible tractable points for comparison useful in future research into social networking's role throughout the innovation process, though any future research will need to determine that comparability of features and parameters suggested herein are statistically or logically verified as innovation processes and, subsequently, the strength of the commonalities. All elements included in the table represent blind, quantitatively derived content, but, at points in the table and especially at its end, categories are shown where no corollary appears present between available data. IMDb provides most of these categories that lack any parallel in the USFDA-USPTO-affiliations dataset. Partly, these are included to satisfy comprehensive disclosure, but they also to notify the reader of other potential points of contact for future research that either finds additional comparable data

features in pharmaceutical innovation data or finds and develops a data source other than pharmaceuticals. As such, the above table comprehensively lists for comparison between the blind and quantitative social networking content of innovation processes in drug development and film production.

3.6 Conclusion to Applicable, Available Data Sources

Building a useful database is benefitted by law or custom forcing full disclosure. American drug development and English-language countries' film offer data content for those reasons. Nevertheless, the terms of the transparency fit their needs, so require some interpretation and interpolation to ensure accuracy of results. Further, owing to the overwhelming mass of data available in the film industry by the large volume of movies and the compounding divisions of labor and individuals within those divisions, the near prohibitive scale and scope of entries from that industry legitimize both limiting the scope to only those few professions with the proven highest connection to creativity and scale to approximately the number offered in the compared database, in this case that of pharmaceuticals' discovery and development.

Discussion

4.1 Introduction to Questions for Discussion

Substantially, comparative analysis of the patterns of social networks in drug development's and in scripted film and television production's creative communities tests their groups' constitution to find correlations among variables. Since drugs and film and television can be assumed to be independent of each other, given that the nature of the professions, institutions, and markets are radically distinct, correlated results suggest that external factors are impacting both. Identifying these externalities is beyond the scope of this report, so would be the subject of the further research for which this report is introducing these databases. Mainly, this is tested longitudinally to determine patterns' evolutionary trajectory. Synchronous change is explored as shown in the following questions:

- a) Group Size Developments: has the number of members in creative groups changed?
- b) Group and Institution Diversity Developments: has the composition of membership by sex or geography changed?
- c) New Diversity: has sources of geographic diversity changed for inventors and artists?
- d) Duration of Innovation Process: has the length of production time changed?

- e) Pluralization of Institutions in the Innovation Process: has the number of production companies or assignees changed?
- f) Gross Innovations: has the number of drugs or films/television programs changed?

Thus, patterns in the constitution of innovations' social network among inventors are available for assessing correlations among reported characteristics in the pharmaceuticals and the film and television industries over time.

4.2 Group Size Developments

Positively or negatively correlated change in the quantity of people grouped for inventive or creative activities indicates presence of a common impacting factor. Examples of possible causes include generalized temporal effects (time) and specific macro-economic events (economic or financial crisis or exuberance, new technology, altered law or policy). From the demand side, enlargement of creative groups suggests that inventive work demands more varied intellectual capital inputs or occurs under greater time pressure. From the supply side, efficiencies and scarcities scale back group size, reduce time pressure, and encourage investment in research tools. Given that some supply and demand features of creativity impact across creative industries, positive correlations deserve investigation to determine whether they accrue from features of the novelty-generating environment, such as policy. Internalities, like that the consumer-demand market for drugs tends to be less discretionary than is that for new entertainment, produce so lack of correlation that is most likely to express itself as vacillations between the markets. Negative correlations arise from contrasting traction in sales, as can be expected to result from factors like the demography of aging and changes in the prevalence of non-communicable diseases. Combining results of these three outcomes has the potential to develop, by deductive statistical analysis, generalizable conclusions from innovations' creators' social networking. Thus, the similarities of changes among inventors and creators over time or across the line of specific events show that at least one development parameter coincides with or causes the observed evolution.

4.3 Group and Institution Diversity Developments

This assessment encompasses several possible factors to be tested, like members' sex and location, possibly age, employment role (such as manager versus other, and academic versus commercial creator, and entrepreneurial inventor versus funded inventor), if employment can be derived. However, comparable changes in the characteristics of participants in innovations' inventive social groups over time or in

response to singular events demonstrate influence on social networks composition. Note that the change may not have an effect on innovative or inventive products, but may only reconstitute group structure. Whether more of one or other sex or if greater dispersion of contributing researchers is beneficial is debatable, but certainly is not within the assessment parameters of this report. This report only outlines databases that are worthwhile to construct for purposes of comparing the results of social network formation. Hypothesis testing would occur subsequently, using these databases. Furthermore, preliminary research would simply aim to determine if there is a common effect.

Detectable macro-developments include, but are not restricted to, time, events, economics (such as improved communications and institutions), finances, or markets). Time is a loose category encompassing a great variety of chaotic factors that may, nonetheless, result in some overarching trend that may or may not be possible to parse into its constituent elements. It may influence drug development and entertainment together by the progressive development of tastes and fashionable interests, but may also arise within the two industries simply as a product of their maturing, which is a continuous macro-effect where tastes and interests may vacillate, cycle, or wander aimlessly. Events, as with group size, have a peculiar role, owing to its one-time impact, but comparing between drugs and entertainment may be more treacherous. Given the large role that men are seen as playing in both industries, the rise of a high profile woman may result in women entering the field. This could be tested by difference of means before and after the profiled woman's popularity augers some margin of public attention plus some length of lag-time to account for the time required to educate the next generation of women. The same may be found for geography. Other event changes may result from the institution of new laws or policies, even those not directly involved in either of the industries, as would policy changes that encouraged universities to train more female or foreign students. Economic issues may appear to be temporal issues, but the true source lies in the economy, such as entrance of revolutionary technology, communications, education, data management and computing, demographics, and fracturing or consolidation of the institutional environment. For instance, as manufacturing moves to cheap-labor countries, increased focus on services and on precision manufacturing may reduce costs of the tools of both the drug research and the film and television production trades in unison, thereby allowing increased involvement by relatively cash-poor, non-traditional people. Diversification would be the result of this wider inclusiveness. Finances may appear micro-economic in nature, so should not be uniform and distinguishable from economic impacts, but its effects can be separate.

Change in the availability of investment capital for creative industries would have a broad and disproportional effect as reductions in funding would exponentially heighten risk such that only far safer projects from creative teams with the best track record receiving the remaining funding. Entrance of new talent would decline and the status quo would uniformly curtail the changes in the social network that this facet would test. Consumer markets also portend significant related impacts, such as in the face of the demographic shift, increased wealth of non-traditional buyers, and rival products siphoning away potential market scale. Thus, as these many examples suggest, groups' locational and male-versus-female composition alters under the effects of time, events, or other longitudinal, but definable, factors'.

4.4 New Diversity

In addition to simple increases in the balance of proportions of men to women and people from varied localities rather than single clusters, there is matter of changes in pluralities prevalence and the complexities of those mixes, the relationship between the location of projects and the proportion of mixed nationality and complex-mix projects, and the rate of change in each location (national innovation system). Since males and females are the only two established sexes, only the differing proportion of each sex and the proportion of projects including each or both sexes are relevant. To more clearly understand the content of this point with relation to geography, it addresses the following questions:

- (a) Has the ratio of the drug invention and film or television projects with people from more than one nation changed?
- (b) Has the number of nationalities represented in individual projects changed?
- (c) What are different nations' results on the previous two parameters?
- Finally, (d) what are different nations' trajectories in the rates of change?

These are related to change in composition, but of overall diversity's change under external effects, which, if contrastable between industries, suggests that those industries are insular and, if comparable, suggests of general factors initiating evolution across industrial sectors. Here, too, changes in diversity may have a positive, negative, or no effect on innovation, so supplementary research is needed to answer that question. Similarly, sources of said factors may be any of many, particularly by time, events, economic, financial, or market conditions, or by-products of immigration. Such factors may be specific to each industry or may show common or contrary impacts. Outcomes that are specific to each industry deny comparability, so designate insularity with regard to the tested factor. Where difference of means statistical analysis shows positive or negative correlations, the nature of each

industry's innovation process is either similarly or differentially affected by the factor's imposition, but a relationship is definitely asserted. Changes in diversity among inventors and artists may occur in ways that are specific to each industry or may be compared and, so, be generalizable.

4.5 Duration of Innovation Process

Innovation is a process both based on inspiration, as expressed by inventiveness, and on perspiration, as expressed by the number of people and time expended to achieve the final product. Hence, speed of the creative process may indicate an impact of other factors or that progress into new areas requires increasingly sophisticated solutions, whether those new areas are more complex molecules or a more demanding viewership. Though audience and chemistry suggest that analytical similarities are derived from unrelated industry characteristics, that appraisal may be simplistically generous. Shifts in pervasiveness of media and information technologies are likely to have wide-ranging impacts on the nature of public perception and of research. For drugs, the separation in time between patent-granting and drug approval is an effective proxy for estimating the overall speed of the innovative process in that industry. For films and television programs, the corollary would be the length of time between principal photography and movie release. Unfortunately, no database specifically lists films' dates of principal photography, so, as mentioned above, this point of evidence requires supplementary research. While not universally available, diligence allows a large contingent of major films' dates of start and end of principal photography to be found. However, establishing a workable corollary for television is problematic, since the structure of television programs tends to involve ongoing creativity rather than a fairly clear two-point ((a) invention date/(b) innovation date) process. It is further complicated by the lack of case-specific information on television programs' principal photography dates. For this reason, avoidance of television source data for research that asks for comparison of the rate of innovation processing is merited. Therefore, indications of duration of the innovation process may accrue in consort with other factors or independently to show that underlying features in the innovation environment are creating uniform change across the sphere of innovation in many industries.

4.6 Pluralization of Institutions in the Innovation Process

Part of the interrelationships among creative individuals is their relationship to their common institutional infrastructure. As a result, change in the number, location, and type of institutions that constitute invention's material and administrative environment indicates possible evolution in the demands of innovation, invention, and external

characteristics affecting the process. These externalities include such considerations as the financial market's appraisal of and appetite for risk and that different types of institutions may seek different results from being named at the institutional level. The increase or reduction in the number of institutions involved suggests that the costly risk of research and development of drugs and production and marketing for films are being diffused across multiple firms. Of these, films' marketing institutions are excluded from this assessment, because any creativity that occurs there is not within the realm of intellectual property development and has no data-driven corollary in the pharmaceuticals. Drug marketing occurs absent public disclosure. Institutions' locational dispersion may occur for political, market, or practical reasons, such as financial supports from government provided to attract projects, diversity of imagery or content whereby specific vicinities may offer access to attractive filming locations or clusters of vanguard technologies and knowhow. As an example of this, New Zealand's disproportionate involvement in film development can be traced to Peter Jackson and Fran Walsh's Weta Workshop. This is true of drug development, too, where biotechnology clusters, particularly near leading universities, see the sharing of research results with little regard for location-based constraints to sharing, and the same is substantially true of the type of institution (public versus private), as collaborative and sponsored research brings tertiary education institutions together with corporations to usher potential products through various stages in future products' development. For film, the collusion of different firms in the production process is more typically seen where firms from one category of the industry spill over into others, such as talent agencies, or actors themselves, entering into production tasks and distributors becoming involved in production, too. Forward and backward integration is an ongoing consideration in film and television. The past divide between television and film production is an area of lateral spill over. Multiple institutions becoming involved may also indicate the presence of multiple, exclusive interests. This is apparent when universities ask that their names be included as assignees, but claim no financial rights or risks for doing so. In such an instance, the corporate partner is motivated by cash while the university seeks recognition. The great variety of reasons for forward or backward integration and spill over in film is so multiplicitous as to be daunting to research, since it may be anything from part of the deal to win a film's casting contract for talent agents or it may be an effort for distributors to control content in order to assure a profitable end-product. While the expression of many of these factors may outwardly appear distinct between drugs' and motion pictures' development processes, statistical assessment may illuminate unexpected and even counter-intuitive correlations related to the innovation process' commonalities. To conclude, though the specific causes require subsequent study,

first, finding similar evolution in these two industries suggests that some underlying effect is impinging on their outcomes, so subsequent study is worthwhile in order to determine what is causing those impingements.

4.6 Gross Innovations

The last parameter noted here is change in the total quantity of innovations: actual movies being released and drugs being marketed. Change in the population of innovations indicates altered trajectory of scale or scope. Scale (size) includes growth or shrinkage in the market. Scope (density) includes the parsing or consolidating of products as separate from scale. Increasing the number of products in a given market tends to both grow that market and reduce profits through competition. Decreases tend to have the opposite market impact. Relating changes of scale across both the film and the drug industries' innovation processes seems unlikely, but cannot be discounted without testing. Of scale and scope, backwards anticipation of marketing capabilities or forward results from increased funding of projects, as with governments' competition to attract industry relocation, and changes in productivity, as from introduction of new technologies, business practices, or markets, alters interest in and, so, amount of creative work dedicated to projects in both industries. Likewise, budgetary constraints could diminish infrastructural development and raise taxation and other near-tax expenditures as would raise costs and, worse, increase unpredictability's risk. Differentiation between scalar and scope effects is critical to analysis, but somewhat problematic, given that environmental changes have both effects simultaneously. This differentiation problem compromises the integrity of any resultant conclusions. Alterations in scale or scope show themselves in the population of innovations and indicate underlying pressures, particularly directly to investment in innovation and indirectly and backwards from changes in the profitability of consumer markets.

4.7 Conclusion to Points of Discussion

This discussion began with the idea that assessing commonalities in the patterns in the constitution of creative people's social networks while they undertake their innovative processes would be helped by comparing drug inventors with film and television creative personalities. Suggested axes of comparison included were: (a) group size developments, (b) group and institution diversity developments, (c) new diversity, (d) duration of innovation process, (e) pluralization of institutions in the innovation process, and (f) gross innovations. During this discussion, the rationales for discarding television production and non-English movies were entered. Owing to the ongoing nature of its production rather than the distinct stepped approach of both film

production and drug development, television production lacks the others: two-step invention-to-innovation process. Non-English film lacks global market penetration that is in balance with and fulfilling for comparison with pharmaceuticals. Thus, details of the patterns in the constitution of innovations' social networking among inventors are discussed and considered as to their availability for testing in any research that compares the social network structures among pharmaceutical industries' innovations' inventors and the film industry's movie productions' creative personalities during the innovative process for the purpose of identifying correlations among reported characteristics in the ultimate search for expressions of factors affecting both industries in common.

Conclusions

Returning to this report's greater theme as presented in its introduction, the search for policies that are effective in managing the innovative process in industries would benefit from including assessment of maximally blind, quantitative, and longitudinal data. This report suggests how that could be done using a database of pharmaceuticals' innovations and another of films'. First, derived from Nootboom's composited analysis for determining speed of innovation from social networking data and founding that analytical technique on the micro-economic logic of cognitive distance within a Transaction-Cost framework, this report introduces a composited pharmaceutical industry database and a nearly single-source database of the film industry. Second, both databases count features that may or may not ultimately prove to be innovative, but for which diligence demands statistical testing to verify whether or not they are, rather than summarily dismissing them. Since the purpose of this report is to suggest and outline how innovation processes in these two innovative, but otherwise highly distinct, industries may be undertaken and offer new perspectives and understanding of innovation processes generally by using a research framework that compares their features in search of commonalities and correlations in the face of similar developments in each one's operating environment. Thus, revising Nootboom's analytical approach to deductive testing is the first major step toward formulating effective quantitative social network analysis and finding and developing data-sources into comparable databases is the second. Securing valid and valuable data-sources to assess creative individuals' patterns in networking is shown to be constrained by factors limiting the depth and breadth of generalizability. Research into the social networking nodalities of the people who found innovations suffers from use of questionnaires, which risk respondents articulating their interrogators, rather than their own, expectations and apprehensions, and invention,

which is not validated for usefulness and relevance by market entry. Survey respondents represent themselves differently due to interpretation of questions. Invention, lacking corollary of market entry, ignores policy's purpose, in addition to the non-market expression of firms' innovation management, which values secrecy over disclosure and standardization. Thus, to those data that can be compiled into databases that are comprehensive in their reporting, are authentic to the creative efforts that lead to innovation, and useful for social network analysis on innovation's inventors and authors are herein limited to that of the pharmaceutical industry's drug development processes and the film industry's writing and principal photography elements that lead to distribution. The structure of comparative research of these two industries' innovation processes is vetted and discussed as to their effectiveness in providing reliable research results into a generalizable understanding of innovation.

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David versus Goliath: Harnessing the Power of SMEs in the Fight for Sustainability

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Abstract

Climate change, resource depletion, environmental and economic disparity are the twenty-first century Goliaths. Governments, NGOs and corporations when “fighting” the Goliaths often overlook small and medium enterprises, the twenty-first century Davids.

SMEs have a substantial aggregate impact and are frequently referred to as the “economic engine” of a country. In this conceptual paper, the authors demonstrate that, due to SMEs’ aggregate impact and economic functions, their participation in sustainable development is essential. Most SMEs are intimate with their customers, rely heavily on their local economy, and their owner-managers have stronger motivations than mere profit maximization. This provides the incentive for them to participate in the betterment of their communities. While governments, NGOs, and large corporations are increasingly recognizing SMEs’ importance, there is frequently a gap between their rhetoric and actions in engaging them. SMEs themselves find the concept of SD ambiguous and the terminology inappropriate to their operations. Those that strive to adopt sustainable practices and develop sustainable initiatives frequently are unclear on the appropriate tools or lack the resources with which to do so. This paper identifies key factors that will enable SMEs to not only become sustainable enterprises, but also to champion SD.

Keywords: SMEs, climate change, resource depletion, environmental and economic disparity, sustainable development.

Introduction

Climate change, resource depletion, environmental and economic disparity – these are the twenty-first century Goliaths. Governments have been discussing how to fight these Goliaths for over twenty years with limited success, if any. In some cases, policies have taken us back instead of moving us forward. Sustainable development (SD) is the most promising armament to slay the giants. Non-governmental organizations (NGOs) and the general public have directed their attention on large corporations, due to their global impact and a perception that these organizations have been significant contributors to the problems while small and medium enterprises (SMEs) have been primarily overlooked. This is a disservice as SMEs are the twenty-first century Davids. SMEs have a substantial aggregate impact and are frequently referred to as the “economic engine” of a country.

Designed for a broad audience, this paper provides an overview of sustainable development (SD) and its importance to the global community. A review of SMEs’ contributions, functions and roles will demonstrate that not only is their participation essential in moving toward a sustainable economy, but also SD is essential to their organizations. The paper also delves into how sustainable development within SMEs generally differs from that of large corporations. An examination of current government, NGO and corporate practices will highlight successes and limitations in including SMEs in SD initiatives. The paper ends with an assessment of how SMEs are currently engaged.

Based on this analysis, a roadmap to success is presented. It includes initiatives for government, NGOs and large corporations to address the challenges SMEs experience in their sustainability journeys and to create business environments to facilitate SME participation towards achievement of sustainability. Recommendations follow for the owner-managers of SMEs to promote sustainable initiatives within and amongst themselves.

Research design and data collection

This is a conceptual paper, drawing from qualitative case studies conducted internationally of SMEs and their approaches to sustainability. Such an approach is appropriate when there are few metrics to quantitatively evaluate the subject matter or when the data cannot be assessed adequately using existing frameworks. Because there are many definitions of SD and several approaches, how these concepts can be

effectively implemented by SMEs is an interpretive process. Other scholars have used this method to apply current theories to different business issues, or, as is the case in this paper, to different business sectors.

A variety of supplementary sources have been reviewed to compare and contrast the case study findings with current general practices and progress. It is worth noting that the majority of documents produced relate to corporate social responsibility (CSR) specifically, followed by environmental considerations, rather than SD as a holistic concept. As the concept of sustainable development is continually evolving, and its application has only recently been applied to SMEs, the focus herein is on the most current literature available. Studies within the last five years and the most current government and NGO reports have served as primary data for this analysis.

2.1 Scope, Limitations, and Assumptions

SMEs are heterogeneous and there is no “one size fits all” approach to facilitating sustainable development within each organization. To add further complexity, SMEs experience different sustainability challenges depending on their geographic location. As this paper is designed for a broad audience, its intent is to examine how sustainable development within SMEs generally differs from that of large corporations, with an emphasis on SMEs in developed countries.

Sustainability, CSR, and environmental management are terms frequently used interchangeably within the literature, although each has a distinct nuance, and, so, could be considered independently. Due to limited data availability on sustainable development and SMEs specifically, for the purposes of this paper case studies on all three, as applied to SMEs, have been referenced. This presents a challenge in correlating disparate literatures to holistic sustainable development principles.

The case studies reviewed have been conducted most frequently by interviewing SMEs. Depending on the study, participants were either pre-selected or included based on their willingness to cooperate. The author recognizes that this method of data collection may have impacted the accuracy of the results and subsequent analyses of the studies' authors. As supplementary sources reviewed support case study findings, it is unlikely these possible inaccuracies materially affect the analysis presented herein.

Sustainability and sustainable development

3.1 Definitions and Concepts

“[Sustainable development] is a delightfully diverse, safe, healthy and just world, with clean air, water, soil and power – economically, equitably, ecologically and elegantly enjoyed.” - William McDonough, co-author Cradle to Cradle

Let us start with some commonly available definitions and develop them further with other ideas and concepts.

Sustain: *to keep, or keep going, as an action or process; to endure; to remain viable* (www.dictionary.com).

Sustainability: *capable of being sustained (economics); capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage (environmental science)* (www.thefreedictionary.com).

Sustainable development: *“development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED, 1987).

The definition of sustainable development above was first introduced by the Brundtland Commission in its report *“Our common future,”* in response to global concerns of economic stagnation and environmental degradation at the time (Holliday et al., 2002). While it is the most commonly cited definition of sustainable development, it has been criticized as being vague and lacking direction on how to achieve it (ibid.).

3.1.1 Complementary and Competing Concepts

In addition to the multitude of definitions proposed for sustainable development, concepts such as corporate social responsibility (CSR), eco-efficiency, environmental stewardship, and resiliency have been used interchangeably within both academic and business literature. While it is beyond the scope of this paper to provide a review of the nuances amongst and between these terms, it is worth noting that the definitional fragmentation creates additional confusion for an already ambiguous concept. It also contributes to businesses disassociating their operations from sustainable development, as addressing the environment and CSR are frequently perceived as “add-ons” rather than core business processes (Jamali et al., 2009; Jenkins, 2009). Sustainable development requires a more holistic approach and as such, using these terminologies

interchangeably may actually contribute to the slow adoption of sustainable principles as opposed to being of benefit.

Furthermore, while it has been suggested that CSR is a mechanism with which to achieve sustainability (Bos-Brouwers, 2009; Jenkins, 2009), the “corporate” in CSR naturally precludes SMEs (European Commission (EC), 2004; Fassin, 2008; Spence, 2007).

3.1.2 The three Es

Irrespective of the confusion caused by the myriad of definitions, approaches, competing and complementary concepts, there is one commonly accepted objective of sustainable development: achieving equitability and economic prosperity without exceeding the environmental carrying capacity of planet Earth.

3.2 Why it is Important?

Climate change, resource depletion, environmental degradation and economic disparity are issues that permeate the news on a daily basis, with many compelling arguments as to their importance. While it is beyond the scope of this paper to discuss these arguments in depth, the following points highlight the interrelationship between the three Es and the value in considering them holistically.

- **Environment**

Non-renewable resources, by their very definition, will cease to exist at some point. As mankind’s survival depends on the natural environment, and nature provides the “fundamental rules of the game”, it is essential to develop systems where humans and nature can co-exist in productive harmony (EPA, n.d.; Seale, as quoted by Even-Har, 2012).

- **Equity**

Although tremendous wealth has been amassed globally due to the carbon economy, 1.3 billion people remain “trapped in dire poverty” (DARA, 2012). Research suggests that unequal societies have “lower levels of trust, literacy and social cohesion”, which makes it more difficult to make positive inroads on economic and environmental issues, like overcoming the sustainability deficit inherent in the carbon economy (Wilkinson & Pickett, 2009).

- **Economics**

While profit may not be the reason for the existence of an enterprise, it is a requirement for sustainability, and responsibly designed economic growth has been shown to contribute to improved quality of life and poverty elimination.

Small and medium enterprises (smes)

4.1 Definition and Impact

While the definition of an SME varies globally, governments most often identify them by the number of full-time equivalent workers that they employ (ftes), a certain amount of revenue generated annually, or a combination thereof. When considering the impact of SMEs, the example of Canada shows that this sector accounts for 99.8 percent of enterprises, 60 percent of employment, and 57 percent of GDP (Industry Canada, 2011). Similar statistics are present in the EU (EC, 2012b) and internationally. Furthermore, the International Finance Corporation has identified a positive relationship between a county's overall level of income and the number of SMEs per 1,000 people (WBCSD, 2007).

Clearly, the aggregate influence of SMEs is substantial, which is why they are frequently referred to as the "economic engine" of a country. While non-governmental organizations (NGOs) and the general public have directed their attention to large corporations due to their global impact, high visibility and a perception that these organizations have been significant contributors to the Goliath problems, a UK survey for the Environmental Agency noted that "SMEs are responsible for 80 percent of pollution incidents and 60 percent of commercial waste" (ENDS, 2003) and it is reasonable to assume these statistics are comparable in other developed countries. While these statistics alone could justify the importance of engaging SMEs in sustainable development, additional reasons that are outlined in this section—further underscore the value of embracing their role.

4.2 Why SMEs are Important to Sustainable Development?

SMEs' contributions to sustainable development can be separated into two categories: those that are satisfied with their market niche, but are concerned (or need to be concerned) with operating their businesses sustainably; and those that are seeking market opportunities by introducing new and sustainable products and processes to the marketplace. To distinguish between the two, they are, herein, referred to as "Adopters" and "Innovators", respectively. The majority of SMEs are Adopters. Innovators are natural incubators for such disruptive technologies. While Innovators represent a smaller percentage of the SME business bloc, they are the leading organizations for job growth and hold tremendous promise to radically shift business approaches.

4.2.1 Structural alignment

While SMEs are officially characterized by their size, they also have unique organizational characteristics compared to large corporations. A review of these characteristics suggest that they are not only well structured to match larger enterprises in their sustainability efforts (Fassin, 2008; Jenkins, 2009; Murillo & Lozano, 2006), but also have the opportunity to be SD leaders.

- The most common form of SME is one managed by the owner. As owners, they have autonomy to utilize firm's resources as they see fit – that is, they are not required to maximize profit for a large group of shareholders (Freisleben, 2011; Jenkins, 2009; Spence, 2007; Spence, Boubaker Gherib & Biwolé, 2011; Stubblefield Loucks et al., 2010).
- Organizations' cultures are well-known and reflect the personal values and beliefs of the owner. Their operations are less formalized and codified than they are for large firms and, with less hierarchy and bureaucracy, information is easily and quickly disseminated throughout the organization (Jamali et al., 2009; Jenkins, 2009). This allows for alignment of action that is intimate with the company's objectives, which makes business practices a "way of life" instead of "lifeless documents" (Bos-Brouwers, 2010; Fassin, 2008).
- SMEs are more intimate with their customers and rely more heavily on the local economy than are and do large corporations; relationships are critical to their success (Spence, 2007). This provides the knowledge and incentive for them to participate in the betterment of their communities. It is commonly accepted that sustainability is a global issue that needs local solutions.
- They are flexible, organic, and can more quickly identify and respond to changes in market demand than large firms (Jenkins, 2009; Lefebvre & Lefebvre, 2012; Stubblefield Loucks et al., 2010).

4.2.2 Job creation

In Canada, between 2001 and 2011, small firms accounted for 43 percent of all jobs created (Industry Canada, 2012). Statistics in the United States (US) cite an even greater impact. In researching the recovery periods of the recession's post-World-War-One, Henry Nothhaft discovered that "since 1977, *all* new job creation in the US has been due to startups," (Harvard Business Review, 2011). In addition, startups provide more opportunities to women and minorities and this naturally fosters a more equitable distribution of wealth. "Unlike corporate management, there is no glass ceiling in a company you start for yourself" (Chamorro-Premuzic, 2012). In the US, female-owned companies account for over \$3

trillion in GDP – equating to approximately 40 percent of China’s entire GDP (ibid). While similar statistical data for Canada is unavailable, over one third of self-employed persons are women (Industry Canada, 2012).

4.2.3 Integral value chain members

A 2010 internal assessment by Baxter (medical equipment - international) calculated that its supply chain was responsible for almost 38 percent of its carbon footprint, with similar statistics (41 percent) being reported by GlaxoSmithKline (pharmaceuticals – international) (Schatsky, 2012). Puma (apparel – international) calculated their supplier impact to be over 90 percent of total water use and greenhouse gas (GHG) emissions (ibid.). As pressure is placed on large corporations to become more transparent regarding their own sustainable business practices, they will be increasingly focused on ensuring that the SMEs in their value chain adopt similar or complementary practices. As integral members of large corporations’ value chains, the adoption of sustainable practices provides SMEs a competitive advantage in working with these organizations (Freisleben, 2011; Moore & Manring, 2009).

4.2.4 Innovation

While large corporations can provide scalability, historically the majority of disruptive innovations have been introduced by SMEs. This is attributable in part to their organizational structures, but also because many large companies have disproportionately excessive capital invested in current technologies. Such capital investments can lead large corporations to believe they will remain profitable operating in a “business as usual” manner and/or make it difficult to justify the cost of major retooling.

4.3 Why Sustainable Development is Important to SMEs?

“People are looking for meaning, for companies that are doing something positive. Sustainability differentiates us.” - Dominic Fielden, Co-founder, Rocky Mountain Flatbread Company

While the argument for SD as a global initiative is substantive, these large-scale issues often do not resonate with SMEs. One would be hard-pressed to find an individual or company who believes that equity or the environment is not important, but without a clear understanding of how it impacts their own organizations, SD will continue to be perceived as “someone else’s” problem.

4.3.1 Competitive advantage

Competitive advantage is obtained by utilizing the resources and capabilities of the organization to cater to market demand, and a higher rate of profit is realized either through reduced costs or the ability to realize a price premium. While market position is important to ensure long-term viability of any enterprise, SME owner-managers are motivated by factors other than profit maximization (Jenkins, 2009; Lewis & Cassells, 2010; Spence, 2007; Weinzimmer & Manmadhan, 2009). Grant (2008) suggests that a firm may forego current profit achieved through securing competitive advantage in favour of other opportunities, such as customer loyalty, technology, or executive perks. As a result, the concept of competitive advantage can resonate with SMEs on both business and personal levels.

Sustainable principles are based on doing more with less: improving the quality of life of all while simultaneously preserving the natural environment and adding to its beauty. These principles enable Adopters to achieve competitive advantage through improved cost control, risk management, and stakeholder (employee and customer) satisfaction. New approaches such as bio-mimicry, green chemistry, closed-loop production, and service-based sales models, offer tremendous opportunities for Innovators to realize competitive advantage by satisfying under-served market demand.

4.3.2 Resource scarcity

SMEs traditionally cater to niche markets and compete based on product differentiation; large corporations capitalize on economies of scale and commonly compete on price. While their focus is different, SMEs still need to consider costs. From a material cost perspective, SMEs are more susceptible to price fluctuations of natural resources than are their larger counterparts. Resource scarcity creates volatility in pricing and increases business risk. Evidence strongly suggests, with the growing population and wealth creation in developing countries, these challenges will only continue to increase (WWF, 2012).

When organizations minimize waste, improve efficiencies and streamline processes, they realize lower transaction costs without sacrificing value to their customers. These cost savings can benefit the organization by directly flowing to the bottom line, freeing up resources to provide added value to the consumer, or to enable the organization to become more cost competitive.

From a human resource perspective, SMEs compete with large corporations for talent and frequently cannot provide comparable wages, employment security, or opportunities for upward mobility. By cultivating an environment of caring, incorporating fair labour practices, ensuring safety and promoting personal development, they are better positioned to attain and retain high quality talent (Fassin, 2008; Murillo & Lozano, 2006). In addition, individuals prefer to work in organizations with purposes that align with their own values (Holliday et al., 2002). SMEs that incorporate sustainable practices will attract like-minded individuals and secure company members committed to their organizations' vision.

4.3.3 Market demand

SMEs are heavily dependent on their external relationships with customers, suppliers and other industry members (Jenkins, 2009; Stubblefield Loucks et al., 2010). Looking at it from the other direction, consumers show increasing interest in purchasing responsibly and members of the value chain look to partner with organizations that treat them fairly. In a recent US survey by the League of Conservation Voters, "An overwhelming 93 percent say there is a moral obligation to leave an Earth not polluted or damaged to future generations, with 67 percent strongly agreeing" (Johnson, 2013). By considering the needs, preferences, and objectives of these stakeholders, SMEs are better able to deliver customer satisfaction.

While large corporations are customers for many SMEs, they can also be competitors. As consumer demand for sustainable business practices increases and large corporations can demonstrate they are meeting those needs, that competitive advantage among SMEs would be compromised.

4.3.4 Imminent regulation

While converting to renewable sources and minimizing waste can produce cost savings for SMEs, many environmental regulations have the potential to increase costs to businesses. With increasing global pressure to transition to a greener economy, regulation will only increase. SMEs proactive in adopting new technologies prior to regulation have the time to experiment and find the most cost-effective approaches for their organizations.

4.3.5 New Opportunities

Sustainable development will require a new way of thinking, and new processes and business models (Holliday et al., 2002). As one competency of SMEs is their ability to improve existing products and services, and to create new ones, SD can be viewed as a

tremendous opportunity for this sector (Jenkins, 2009; Lefebvre & Lefebvre, 2012; Stubblefield Loucks et al., 2010). As important as innovation is to sustainable development, it is the basis on which SMEs create value, niche markets and product differentiation.

4.3.6 Ethics

“Indeed the modern organization was expressly created to have results on the outside, that is, to make a difference in its society or its economy.” - Peter Drucker, Management guru

Businesses, both large and small, have an obligation to be good corporate citizens. It is their “license to operate,” (Sexty, 2011). Most SMEs are rooted in their communities and are greatly impacted by the local economy and environmental conditions (Medina-Munoz & Medina-Munoz, 2000; Moore & Manring, 2009). Healthy, prosperous, and diverse communities ensure the long-term viability of any organization. “Business cannot succeed in societies that fail,” (Holliday et al., 2002).

SMEs are motivated more by metrics such as quality, customer service, employee satisfaction and ethics than by profit maximization. SMEs naturally embrace sustainable principles as a result. Creativity and innovation are further nurtured when SMEs view current business models, and products/services through the sustainability lens (Lefebvre & Lefebvre, 2012; Stubblefield Loucks et al., 2010).

Relationship of SMEs with government, NGOs, and corporations

Recognizing that both the global sustainable development agenda and SMEs themselves can benefit from SME involvement, it is worth examining the current state of affairs. Several questions arise. Do government and NGO initiatives consider the unique needs of these organizations? How do large corporations promote sustainability practices within SMEs? What is the current degree of SME participation and the challenges they encounter introducing sustainable programs?

5.1 Government and NGO Initiatives

While it is impossible to review the efforts of all governmental bodies and NGO initiatives, the following section provides a general picture of different degrees of commitment in Canadian and European governments, as well as the focus and initiatives of some prominent international and Canadian NGOs.

5.1.1 Canadian vs. European Efforts

Industry Canada has created a sustainability roadmap for SMEs that is available on its website and which is little more than a document that describes responsible business practices and links to other governmental and non-governmental resources (Industry Canada, 2011). Most programs are provincial, and while some target specific industries with sizeable SME participation, (such as farming), the majority do not target SMEs. In reviewing all federal and provincial grants, contributions, and financial assistance, programs to promote “green” initiatives represent less than fifteen percent.

In contrast, with a €3 million budget, the EC (2012a) co-financed fourteen projects over a three year period (2006-8), partnering with multiple organizations and directly organizing events, seminars, and training modules. Considering the EC’s commitment to engaging SMEs and comprehensive reporting on their initiatives, what is surprisingly absent are metrics on the impact that their initiatives have had improving SD adoption within SMEs.

5.1.2 NGOs

International NGOs with activist agendas have been instrumental in raising awareness of sustainability issues, primarily on an international level (IISD, 2012). With this focus, NGOs’ engagement naturally is geared toward large corporations, but SMEs are impacted indirectly. Understanding the influence large corporations can wield, watchdog NGOs have drawn attention to the sustainability practices of these companies’ value chains as well as their own operations. NGOs with a willingness to work with business enterprises are partnering with large corporations to create programs that fund and cultivate sustainable development within the operations of their supply chains.

There are varied levels of SME engagement with NGOs that focus on education, information dissemination and the development of programs to support sustainable development within businesses agendas. Two organizations spearheading international frameworks for sustainability – the Global Reporting Initiative (GRI) and the International Standards Organization (ISO) – have introduced programs specific to SMEs.

The Canadian Business for Social Responsibility (CBSR) is a non-profit organization referenced by Industry Canada as a resource for SMEs, but calls itself “a vital aspect

of the Canadian corporate persona” (www.cbsr.ca). Furthermore, although CCSR introduced a reduced membership rate for SMEs in 2013 (50 percent less), its message: “get visibility for your valuable CSR commitments” is unlikely to interest the typical SME owner-manager. Case studies have indicated SMEs are uncomfortable in promoting their CSR commitments (Jamali et al., 2009; Jenkins, 2009).

Alternatively, the Network for Business Sustainability (NBS), is a growing international network of academic and business leaders seeking to align “resource-based practice with practice-based research” (www.nbs.net). With the sponsorship of Industry Canada, it has not only realized the importance of SMEs, but has restructured its organization to direct resources to SME sustainability development. Their first SME conference was held in October of 2011, with a newly created council dedicated to SME issues having its first meeting in March of 2012 (ibid.). Due to its recent creation, it is premature to assess the effectiveness of the SME council or its initiatives however its holistic approach is promising.

5.1.3 NGO Certifications and Eco-labels

Many NGOs also support SD by leveraging their credibility to influence consumers. In creating independent certifications and eco-labels, their endorsements contribute to consumer confidence. This allows consumers to make better-informed decisions and purchase more responsibly, driving sustainable development from the demand-side. Again, while these programs promote SD on a global scale, they have mixed results in supporting sustainability within SMEs. There are over 400 eco-labels in the marketplace, with almost half originating by NGOs (Corporate Sustainability Initiative, 2010). This makes it difficult for SMEs to decide which certification(s) are best suited to their organization. Also, there is little differentiation in the certification process of large corporations and SMEs. As certifications can be time consuming and costly, this puts SMEs at a disadvantage.

5.2 Corporate Initiatives

In a study of France’s 40 largest companies (by market capitalization), the authors found all had adopted some form of GHG management strategy due to significant media exposure and public pressure. The extent to which the companies embraced sustainability, however, varied significantly. To identify these differences, the authors categorized the companies as “Conformist”, “Engaged”, or “Visionary” (NBS, 2012b). As there are varying levels of commitment to sustainable development within large corporations, there are equally varying levels of commitment they make to the SMEs

within their value chain with respect to the adoption of sustainable practices. As a rule, the programs of companies who have embraced sustainable development as a corporate cultural value not only encourage SME participation, but also facilitate their learning, knowledge and implementation.

In 2001, Danone, one French “Visionary” company identified in the study, introduced “The Danone Way”. It is described as “a charter, code of conduct and self-assessment tool that integrates CSR into every business unit” (ibid.).

“Our approach of being an open-minded company seeking to co-design new solutions with our stakeholders is firmly rooted in Danone’s culture and model and contributes to our overall long-term performance.” - Franck Riboud, CEO Danone

Interface is another multinational corporation hailed as a beacon for SD. As a commercial carpet manufacturer, Interface was heavily reliant on petroleum-based products. Its strategy, “Mission Zero”, was formulated in 1994 – the objective: by 2020 to have zero impact on the environment – taking nothing from the earth that cannot be reproduced by the earth, generating no waste that cannot be used as “food” for another process. Its philosophy in regard to its supply chain: a “green” company cannot use “brown” suppliers (Anderson, 2009).

In 2005, Walmart unveiled a “sweeping business sustainability strategy” adapting its business model from an internal focus to external – partnering with non-profits, government agencies, consultancies and academic institutions for expertise (Plambek & Denend, 2008). It has collaborated with NGOs and government agencies to ensure its suppliers meet stringent guidelines (certifications, processing standards) and looked further down the supply chain to recognize opportunities to select better suppliers. Walmart also changed its purchasing model to forge closer, longer-term relationships with its suppliers and help support sustainable initiatives.

While there are many other similar examples of “Visionary” efforts to promote SD within the value chain, industry benchmarking studies by Green Research suggest that overall there remains substantial room for improvement. Although the supply chain accounted for a significant portion of the top performers’ carbon footprints, (publicly available) initiatives to address improvements throughout their supply chains averaged less than 4 percent (Schatsky, 2012). Table 1 provides a breakdown of the data per industry.

Table 1 – Share of Sustainability Goals by Value Chain Location

Industry	Operations Goals Share of Total	Supply Chain Goals Share of Total
Medical Equipment	87%	4%
Non-Alcoholic Beverages	72%	0%
Pharmaceuticals	90%	3%
Telecommunications	69%	7%
Food Processing	87%	4%
Source: Green Research analysis (2011-2012)		

5.2.1 Social Initiatives

While an increasing number of large corporations are advancing environmental initiatives through their supply chains, adoption of social initiatives have been slower. Even within “Visionary” organizations, social initiatives (other than philanthropic) have been introduced subsequent to environmental ones. This can be attributed to the fact that environmental improvements are easier to benchmark and cost savings directly benefit the bottom line.

Many large corporations encouraging sustainable environmental practices within SMEs –Walmart included – are also pressuring these same companies to cut costs and fix prices (Fassin, 2008; Mitchell, 2012). The trend to use manufacturing and support services offshore forces local SMEs to compete with labour rates unsustainable in their home countries and/or produce inferior quality (and subsequently more disposable) products. This sends mixed messages to SMEs – should they invest in sustainable practices for long term benefit or be the most cost-competitive?

5.3 SME Participation

Because of the heterogeneous nature of SMEs and their lack of formal reporting, it is more challenging to assess their participation than it is within large corporations. A report from the EC’s (2004) Roundtable concluded that relatively little is known about CSR practices within SMEs and better baseline data is needed to more accurately assess the scale and impact of their initiatives. They noted, however, that it is clear many SMEs are committed to sustainable practices (ibid.). Although additional research has been conducted subsequent to its report, conclusions regarding SME participation have been mixed. CSR, as it applies to large corporations, is rarely found in SMEs, but CSR principles – at varying degrees – are well entrenched in many SME operations (Fassin, 2008; Jamali et al., 2009; Jenkins, 2009).

Spence et al. (2011) conducted a study of 44 SMEs in three French-speaking countries and labelled participants' efforts similarly to the study of France's large corporations: "Indifferent", "Aware" and "Committed". These labels underscore the personal nature of SME operations. An "Indifferent" organization reflected the owner-manager's opinion that they are "not guilty" of environmental degradation; that it is "someone else's" problem. Conversely, owner-managers of "Committed" organizations were "convinced that their actions will benefit the larger community [and]... provide them and their employees with a living and make them better persons, as well as give them a competitive edge" (ibid.).

The importance of personal values of the SME owner-manager cannot be stressed enough. In all case studies reviewed, the company's commitment to sustainable practices was a direct result of the owner-manager's buy-in and, in most cases, initiatives are personally implemented. As a rule, although their practices are not formalized, they are internalized – "*the way we do business around here*" (Bos-Brouwers, 2010; EC, 2004; Fassin, 2008). Formalization is more prevalent when required by governance or international business relations (Spence et al., 2011).

Contrasting to large corporations, research suggests that SMEs place a greater emphasis on the social aspects of SD over the environmental. This can be attributed to the fact that such initiatives require less capital, utilize existing resources and are congruent to their business objectives. Most SMEs have an ingrained sense of responsibility to their employees, customers and community (Fassin, 2008; Jamali et al., 2009; Jenkins, 2009; Murillo & Lozano, 2006). Reliant on local economics and reputation, issues that concern them most are more personal – work-family issues; employee retention; trust; altruism (Jamali et al., 2009).

5.3.1 Environmental Initiatives

The UK Environment Agency's 2009 survey of 7,000 respondents identified a steady increase in the adoption of environmental measures since 2005. The most common measures were incorporating cost reductions such as recycling and reducing business waste, improving energy efficiency and reducing water usage (Netregs, 2009). While larger SMEs (50-249 ftes) were more aware of their environmental impacts, the majority of businesses still considered a formalized environmental management system (EMS) to be of "little or no use" to their organizations (ibid.).

The results of Netregs' survey are supported by case studies in both developed and developing nations. Many academics and NGOs have concluded that while there is

increasing awareness, the majority of SMEs continue to view their environmental impact as negligible or environmental initiatives as too complex and costly to implement (Lewis & Cassells, 2010; NBS, 2012a; Revell, Stokes & Chen, 2010).

When resource efficiency or environmental conditions are perceived as crucial to competitiveness, SMEs are more likely to engage in learning and incorporate systemic practices (Cassells & Lewis, 2011; Millard, 2011). For example, in the rubber and plastics industry, oil derivatives have already become increasingly costly and scarce, which has incited several SMEs within the industry to utilize renewable (and environmentally-friendly) alternatives and re-design processes to incorporate recycled materials and reduce waste (Bos-Brouwers, 2010). Not only has this eco-efficiency provided them with more consistent cost control, to several it has been a source of value creation for their organizations. Similarly, recognizing environmental preservation as a necessary element in securing their livelihoods, SMEs in the Canary Islands have voluntarily implemented environmental system certification within their farming and tourism industries (Medina-Munoz & Medina-Munoz, 2000).

5.3.2 Leadership Examples

In addition to academic literature, current news increasingly features small companies who have embraced sustainable principles. For example, Johan Reyneke Jr. converted his family winery in South Africa (a multi-generation business) from conventional to biodynamic, self-sustaining agriculture. His reason: “I wanted [my two girls] to be able to play in the fields. If I was spraying chemicals, they wouldn’t be able to do that” (Siddiqi, 2012).

Five “green” building companies were featured in the October 2012 edition of *Canadian Contractor*. While each has a unique emphasis on their sustainable principles, all had incorporated green products and methods over and above mere energy efficiency, and agree that “the perception that green is prohibitively expensive is outdated and misleading” (Laudrum, 2012).

Lehigh Technologies, backed by venture capital funding, converts used tires into micronized rubber powders for re-use in other products such as new tires, pallets and waterproofing. Green Roads Recycling partnered with two other paving contractors and the British Columbia government to develop technology to recycle asphalt in place. Both company managers echo the same sentiment: burning, burying or down-cycling finite resources are not solutions... they are problems to be solved (Gunther, 2013; Thompson, 2012). Despite challenges faced in gaining widespread

acceptance (Lehigh's plant currently operates at only half-capacity), they are convinced they are providing answers for the future.

Many SMEs are creating cooperatives on their own within their industries. CROPP, the largest cooperative for organic farmers in the US, boasts over 1,700 members and is projecting growth over 25 percent this year (Guevarra, 2012). They provide marketing expertise to their members that any one SME would be unable to maintain, let alone afford, and pay higher rates to their farmers than any other organic co-op in the country (ibid.). CROPP provides other membership support to advance sustainable practices as well. Examples are process implementation assistance, administrative guidance to obtain organic certification and animal care specialists.

Leadership in sustainable practices is not new for many SMEs. For example, Ecological Fibers, Inc. has been committed to environmentally sound paper coatings since the 1970s (CICA, AICPA & CIMA, 2011). The owner-manager "was more interested in protecting the environment and his employees than saving money" (ibid.). When every other company in the industry was using solvents, Ecological Fibers developed a water-based solution with no harmful components – protecting the environment, the health of its workforce and any potential risk to its end users (ibid.). Over the years, other sustainable practices have been incorporated in both its manufacturing processes and facilities – such as using only FSC certified products, incorporating post-consumer recycled content, energy efficiencies, and converting to cleaner energy.

5.4 Challenges

While there are an increasing number of examples of SMEs implementing sustainable practices, they remain a minority. This can be attributed to the challenges discussed in this section.

5.4.1 Concerns about "Greenwashing"

Newsweek magazine study determining which US companies are the "greenest" discovered that, not only do "the worst environmental performers communicate more extensively on their environmental actions", but also that "both reputation and membership in the Dow Jones Sustainability Index (DJSI) appear to be related more to what companies say through environmental disclosure than what they do" (Cho, 2012). A cursory review of the sustainability commitments of Accor, a "Conformist" according to the French study referenced earlier, would suggest to the reader that the organization has a robust program (Accor, n.d.). The more comprehensive review

conducted by that study's authors, however, led them to conclude that the company does nothing more than meet regulations (NBS, 2012b). This supports the concern that is cited by many SMEs that environmental responsibility and CSR within large corporations are merely communications and marketing strategies rather than cultural values (Fassin, 2008; Jenkins, 2009; Murillo & Lozano, 2006). As a result, it is understandable that SMEs are reticent to associate themselves with similar practices.

While the third-party certifications of products and services by NGOs may contribute to consumer confidence, there is little empirical evidence of a "causal link between certification or eco-labeling efforts and real improvements in social and environmental outcomes" (Corporate Sustainability Initiative, 2010) and fraud cases have demonstrated that audits do not guarantee performance either (Fassin, 2008).

5.4.2 Terminology

There continues to be much confusion regarding what constitutes sustainable development. Terminology and business practices not only need to be more clearly defined and standardized, but also adapted in order to be applicable to the unique organizational structure of SMEs. Case studies and government reports indicate that even the language used to define sustainability does not resonate with SMEs. "The very phrase 'Corporate Social Responsibility' implies a certain size of enterprise" (EC, 2004). One company presenting at the EC's CSR forum stated, "we did not want to be in CSR but now we are happy we did" (EC, 2004), underscoring the negative stigma SMEs attach to it as a "big business" philosophy.

5.4.3 Tools

"Overnight, our sector was inundated with initiatives and certifications aimed at facilitating the adoption of sustainable practices. Making an informed choice about the best solution for our company was a laborious process." - Jean Barbeau, Artopex, NBS SME Council member

While there is increasing exposure for and interest in SD, there is still much debate regarding effective implementation and confusion about which tools are the most appropriate to incorporate (Murillo & Lozano, 2006). For example, how does an SME choose the eco-label(s) with which to incorporate? Support offered by formal organizations is seen as "patchy, not coming from the right sources, is confusing, overlapping or is not the right kind of support" (Fassin, 2008; Jenkins, 2009).

Information overload can cause paralysis, with SMEs choosing to continue “business as usual” rather than trying to navigate the labyrinth of options.

There is also a tendency to “re-size” CSR for SMEs instead of re-examining principles to address the unique characteristics of these organizations (Freisleben, 2011; Jenkins, 2009). For example, although admirable in its effort to engage SMEs, few SMEs implement GRI reporting, and the complexity of International Organization for Standards (ISO) certification led a Guardian reporter to suggest the acronym really stands for “irritate small organizations” (Large, 2012).

5.4.4 Lack of Demand

Weak industry pressures and governmental policies have signaled to SMEs that performance on issues of environmental protection and stability is not a priority and many SMEs have that stated consumers are unwilling to pay a premium for environmentally responsible products or services (Revell et al., 2010; Spence et al., 2011). As research indicates this is a changing trend, and as more organizations understand how to migrate to sustainable practices without the need to pass cost increases to their customers, this is the least substantiated argument, but does attest to owner-manager attitudes.

5.4.5 Owner-manager Attitudes

“Without a committed entrepreneur, nothing happens,” (Spence et al., 2011). Owner-managers may incorporate some initiatives that are personally valuable to them and forego others. Millard’s (2011) research suggests that more stable companies are less likely to be receptive to learning.

A lack of awareness also influences owner-manager attitudes. With 93 percent of UK SMEs believing they do not engage in any harmful environmental activities (Netregs, 2009), it is understandable that they perceive environmental management as superfluous.

5.4.6 Resource Poverty

It has been argued that business needs to actively engage in the sustainability solution, because they have not only contributed to the problem, but, also, have the resources necessary to provide solutions, (Hart, 1997; Holliday et al., 2002; Wilson, 2003). While the former may be applicable to SMEs, a common argument for why SMEs do not engage in sustainable practices is their resource poverty (Bos-Brouwers, 2010; Cassells & Lewis, 2011; Freisleben, 2011; Murillo & Lozano, 2006; Revell et al. , 2010).

Even with the desire of the owner-manager, lack of manpower or capital required can prevent the introduction of new initiatives or the ability to obtain third-party certifications (Lewis & Cassells, 2010; Murillo & Lozano, 2006). Although the long term benefits of environmental initiatives frequently outweigh costs, many require initial capital expenditures and expertise that may be difficult for SMEs to acquire.

Third-party certifications can be lengthy and costly to obtain and more difficult for SMEs to absorb than for their larger counterparts. Formalized reporting procedures are labour intensive and do not suit the organic structure of SMEs (Fassin, 2008). Even the “SME friendly” ISO 14001 reporting standard remains costly and cumbersome; direct and indirect costs can exceed \$35,000. Additionally, there are other management and supporting costs associated with embracing sustainability. Thus, some SMEs “simply pay the fines associated with environmental regulations rather than initiate a costly and seemingly complex management standard” (NBS, 2012a).

5.4.7 Access to Capital

Access to capital through traditional investment mechanisms is difficult to obtain and usually incurs higher rates or for shorter terms. This has required Adopters to use their (already limited) working capital to fund improvements and restricts the opportunities for Innovators to bring new products or services to market. According to the CEO of one Canadian clean-tech company, the early part of development is the most difficult to fund, but occurs when capital is, perhaps, the most critical (Marshall, 2012). The complexity and administrative requirements for loans, as well as government and NGO-sponsored grants and programs, further exacerbate the inability, and discourage the willingness, of all but the larger SMEs to utilize their programs (Fassin, 2008).

Roadmap for success

*“The stone age didn’t end because we ran out of stones.” - Shiekh Zaki Yamani,
Former OPEC Foreign Minister*

Sustainable development “will require types of partnership never before witnessed in human history,” (Holliday et al., 2002). Until the tipping point is reached where sustainable development is perceived as an opportunity instead of an obligation (commitment versus compliance), and is embraced by all stakeholders, government, large corporations and consumers, SMEs will be slow to embrace its principles. SMEs need to be engaged in the same manner in which they do business: locally;

personally; and, within networks and associations with whom they trust and regularly interact. Based on the analysis above, governments, NGOs, large corporations, and SMEs themselves can implement several initiatives that will greatly contribute to SME commitment.

6.1 Government and NGOs

6.1.1 Walk the Talk

“Without political leaders willing to push change via policy, citizens and corporations are left to grapple with whether and when to change their own behaviours and standards.”

- The Regeneration Roadmap (2012).

Government, like big business, is frequently slow to adopt new protocols and processes. For example, although Leadership in Energy and Environmental Design (LEED) is being adopted by many governmental bodies, new building processes, such as vegetated roofs and water catchment systems, have been disallowed by many; and, conventional paving remains a requirement for Albertan municipalities even though recycled asphalt is a proven green technology. Incorporating sustainable technologies in governmental procurement standards both encourages and supports environmental innovation.

6.1.2 Minimize Bureaucracy and Scale Costs

Requiring SMEs to adopt rigorous reporting procedures or obtain complex certifications may prove not only to be ineffective in achieving the desired goals, but also counterproductive when progress is clawed back (EC, 2004; Large, 2012). It runs the risk that SMEs will focus more on compliance than adopting valuable sustainable practices or, worse, turn them off SD altogether. Widely accessible and easy to understand standards and guidelines, as well as simplified versions of reporting and labeling programs, would be better embraced by the SME community (EC, 2004; WBCSD, 2007).

SMEs already bear a disproportionate burden of regulatory costs (Deveau, 2013) and will be reticent to introduce SD initiatives if compliance is forced via additional regulatory and bureaucratic hurdles being required. By reducing the cost of regulation and streamlining approval processes for sustainable systems and products and their development, SMEs will be encouraged to channel their capital towards initiatives that provide sustainability solutions for the future.

6.1.3 Restructure Incentives and Facilitate Funding

Existing policies and market incentives have allowed businesses to externalize social and environmental costs and have supported non-renewable technologies (UNEP, 2011). Subsidies that promote the depletion of natural capital and use of non-renewable resources discourage investment in and development of sustainable business methods, products, and services. For example, in 2008, global subsidies for fossil fuel consumption were estimated at US \$557 billion (UNEP, 2011). While the Canadian oil and gas industry is controlled by large corporations, the majority of clean tech companies are SMEs (de Sousa, 2013). Eliminating these subsidies and establishing a strong clean energy plan would contribute to providing some of the certainty needed by SMEs to attract capital investment and commitment to sustainable technology development (de Sousa, 2013).

Many grants and programs that are specific to SMEs focus on growth, such as funds for equipment purchase, without consideration for the sustainable characteristics of the initiative. Restructuring these incentives to specifically promote green technologies can provide much-needed capital and mitigate SMEs' risk in adopting or creating SD initiatives. It should be noted that application requirements for such programs should be structured as per the recommendations above: simplified and made easily accessible by incorporating a fast-tracked approval process.

Governments can implement policies to facilitate and promote private investment in SME businesses as well. Providing loan guarantees and tax incentives can mitigate the risk that venture capitalists and traditional lending institutions perceive in investing in small and start-up organizations and new technologies. Crowdfund investment (a new financing structure for raising small amounts of capital from a large number of investors) is believed to become a significant source of financing for SMEs, but is currently not legal in many countries (Invest Crowdfund Canada, 2012). Legalizing the structure, as well as promoting SD business models and practices within this investment mechanism, would encourage SMEs to refocus towards these opportunities.

6.1.4 Build Connectivity and Capacity

Because SMEs are rooted in their communities and greatly impacted by local conditions, the greatest impact will be achieved by shaping sustainable initiatives at and for local or regional levels (EC, 2012a; WBCSD, 2007; WWF, 2005). International agencies speak the same language as international businesses; SMEs identify with smaller, regional entities. National and international governments and

NGOs can partner with local representation, such as municipalities and chambers of commerce, to translate broad initiatives to local scale. This provides the benefit of worldwide expertise developing a web of local solutions to global issues.

Educational institutions, such as universities, business schools and entrepreneurship development centres can be encouraged to add SD to their curriculums and support services. Funds specifically flagged for sustainable entrepreneurship agendas, as opposed to business survival/success education, would be most effective in building those capabilities. Research on sustainable technologies can be supported within the academic community and bridges be built to help SMEs to commercialize those same technologies.

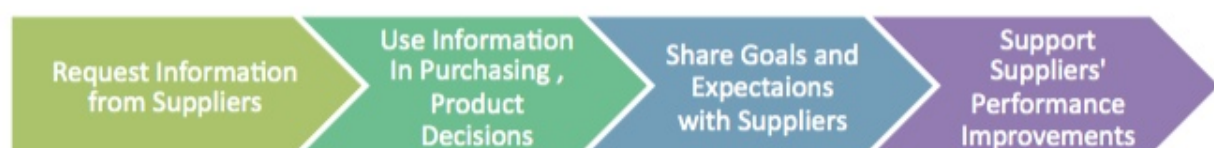
6.2 Large Corporations

“We as global companies can provide the catalyst to partner with SMEs to mutual benefit. We can access their local expertise and markets; they can access our technologies and business skills for local momentum.” - Michael Pragnell, CEO, Sygenta

6.2.1 Maximize Influence

Rather than the typical scorecard used by large corporations, Schatsky (2012) of Green Research, a consultancy, suggests that these companies should “invest in suppliers’ success”. Merely requesting information from suppliers is not sufficient to engage them. “Suppliers often don’t have a clear idea of what is expected of them and where to focus their own sustainability efforts” (ibid.). His company’s four stage engagement process (see Figure 1) is one mechanism to improve two-way communication. This provides vital information to each side for continual improvements in the SD efforts of both. Corporations can reward committed participants by creating a preferred vendor program, sharing cost savings and income generation, and providing access to company resources for joint venture opportunities (EC, 2004).

Figure 1 – Stages of Supplier Sustainability Engagement



Source: Green Research, Schatsky (2012)

6.2.2 Share Resources and Expertise

The resource poverty of SMEs is likely the most common argument for why they have been slow or unable to transition to sustainable enterprises. In many industries, technology is no longer a barrier to environmental sustainability efforts (Caulfield, 2012), however this technology (or the expertise with which to incorporate it) may still be unavailable to smaller enterprises. Companies that share their expertise with their suppliers can accelerate suppliers' performance gains and ultimately improve their own (Schatsky, 2012).

The Sustainability Consortium (www.sustainabilityconsortium.org) is an excellent example of large corporations' commitment to actively supporting sustainable initiatives throughout their supply chains. Initially spearheaded and funded by Walmart in 2009, it was created to improve sustainable business practices across industries and throughout multiple value chains. A primary objectives of the Consortium is to develop "a standardized framework for the communication of sustainability-related information throughout the product value chain [to enable]... rigorous product level Life Cycle Assessments (LCAs) to be done at a fraction of today's time and cost, and provide a platform for sustainability-related data sharing across the supply chain" (ibid.). By such standardization, clear, consistent, and cost-effective data has the potential to greatly benefit the SME community. One thing worth noting is the apparent lack of direct SME representation within the Consortium. While the efforts of the group are brought into the members' organizations to address with their respective suppliers, direct SME participation may contribute to a deeper understanding of universal issues facing their organizations.

6.2.3 Capitalize on the strengths of SMEs

"The more progressive multinationals understand that, to innovate, they often don't do it very well internally" (Marshall, 2012). Many large corporations acquire SMEs that have developed innovations valuable to their operations, however a large percentage of mergers and acquisitions fail to deliver anticipated benefits (Moore & Manring, 2009). Alternatively, providing SMEs with the much-needed capital to develop sustainable products and processes produces win-win scenarios: innovation is expedited through the SME without the pitfalls of assimilation and scalability is available through its larger partner.

A McKinsey & Company article on improving manufacturing operations suggests turning supply chains into supply circles (Mohr et al., 2012). As closed loop systems become prevalent, mechanisms to recover materials to reuse in the production process

will be necessary. Such services are better suited to SME partners, allowing large manufacturers to focus on their core operations. To develop these processes successfully, corporations need to engage in conversation and develop relationships with suppliers to strengthen capabilities (ibid.)

6.3 SMEs

6.3.1 Collaboration (Networks and Alliances)

The most “committed” SMEs freely share information and are active members of networks and industry trade associations (Millard, 2011; Revell et al., 2010). Research suggests that SME owner-managers prefer to learn from their peers, frequently viewing competitors (other industry members) more as colleagues than enemies (Revell et al., 2010; Spence, 2007). While Hart and Milstein (1999) caution that “collaboration among competitors can serve to perpetuate the current industry structure”, Spence et al. (2011) suggest these interactions create normative pressure for participating firms, increasing the commitment to sustainable practices of all.

Alliances within the SME business bloc, either within or across industries, can enable participating companies to promote like-minded agendas, share risks, costs, and expertise. This pooling of resources allows SMEs to become more competitive with their larger counterparts. Moore and Manring (2009) compare the effectiveness of networks of SMEs versus that of large corporations to networked versus mainframe computers: the former can be much more efficient in the twenty-first century marketplace of rapid change by capitalizing on the fluidity and nimbleness of its individual members.

An alliance can also serve to promote relationships between SMEs and large corporations. While SMEs are well-suited to developing sustainable innovations, they need to expertise to successfully deliver and market their creations. As an example, Sustainable Development Technology Canada (SDTC), an alliance of clean-tech companies, serves both purposes. While it supports small companies in attracting capital and developing competencies, it also acts as a liaison between clean-tech SMEs and the larger corporations whom they serve. “Conversations between an SME and multinational [can be challenging]... SDTC operates as a very useful bridge between the two” (Marshall, 2012).

6.3.2 Knowledge

Gaining a deeper understanding of environmental and social issues is important; understanding how to translate this understanding into viable business practices is

critical. Ray Anderson began his company's transformation after reading Paul Hawken's *The Ecology of Commerce* and acknowledging he was a "plunderer of the earth". However, from there, he sought help to understand how sustainability could be incorporated into his business by creating an "Eco-Dream Team" (Anderson, 2009). While SME owner-managers are not in a position to invite the great SD thinkers into their companies' boardrooms (if they even have a boardroom), they can amass knowledge through books and online sources. Participating in the networks and alliances discussed above can reinforce and disseminate the sustainability and sustainable development concepts learned from those sources and help put them into context for their respective businesses (Stubblefield Loucks et. al., 2010). SME owner-managers who embrace sustainable principles may be reticent to boast about their initiatives to their customers, but are very willing to share when it involves promoting the wider acceptance of these ideals (Jenkins, 2009), as within a networked community of their SME and business peers. Millard (2011) concluded that higher level learning was facilitated within networks of broader groups, and enabled companies to see environmental issues in a broader perspective.

Regarding the owner-managers' tacit knowledge and the explicit knowledge gleaned from outside the organization, developing mechanisms to transfer that knowledge throughout the organization is important for ensuring successful SD outcomes.

6.3.3 Leadership

"If you think you're too small to have an impact, try going to bed with a mosquito." - Anita Roddick, Founder, Body Shop

The primary differentiator between a sustainability leader and laggard is personal commitment. As repeatedly concluded in case studies and reinforced throughout both business and academic literature, it is leadership that determines results.

When answering the question "Why aren't there more Ray Andersons [SD leaders]?" the most frequent responses referred to traits rarely used to describe SME owner-managers: greed; lack of ethics; fear of trying new things (Makower, 2012). While a few individuals start businesses with "get rich" aspirations, they are the exception. The majority of small business owners have other motivations such as disenchantment with "big business" philosophy; fulfilling an unmet market; improving their quality of life; pursuing a passion; and making a difference. Many wish to leave a legacy to their children: that is, passing a business down through the

generations, partnered with passing down a healthy, vibrant, naturally beautiful world in which the business can continue to prosper.

The structural advantages of their organizations (see [section 5.2.1](#)) make them ideal candidates to affect change quickly and deeply. To begin this process, SME leaders must critically examine the reason for their organization's existence. Simon Sinek calls this "starting with the 'why'", suggesting that businesses flourish not only because they make great products and provide great services, but also because their staff and the market buys into their purpose (TED, 2009). The incorporation of sustainable practices and pursuit of sustainable opportunities are natural complements to SME owner-managers' motivations.

The challenges that SMEs face should not be marginalized, but strong leadership with a clear vision can mitigate these issues. Leadership is about vision, buy-in, empowerment, and, most of all, producing useful change. Leadership is not about attributes, it's about behaviour. Leadership sees possibilities rather than limitations; and asks "How can we?" instead of explaining "Why we can't". This is entrepreneurship in its truest form.

1.1 Collectively

"[I]t's less about trying to generate a whole new set of ideas and more about bringing all the good ideas together... and giving them the impetus they need to have an impact on a [larger] scale." - Sally Ride, Education Activist

While this roadmap has examined how different stakeholders, including SMEs themselves, can contribute to sustainable development within SMEs, almost all solutions involve some degree of collaboration. In a post-Rio+20 survey conducted by GlobeScan/SustainAbility (GS/SA) (2012), sustainability experts overwhelmingly viewed collaboration as "one of the few models that could catalyze solutions to the sustainable development challenges that we face at the speed and scale that we need". Collaboration spreads risk and allows access to expertise and diverse perspectives unavailable within a single organization (GS/SA, 2012; Millard, 2011). Each stakeholder group brings a different strength to the table; each organization within these groups a unique perspective:

- **Governments** – the ability to set policy; and, create regulation and market instruments to support demand, and encourage innovation of and investment in sustainable technologies
- **NGOs** – objectivity and credibility to develop and administer independent assessments and to support consumer confidence; and, provide guidance for implementing and maintaining best practices
- **Large corporations** – global reach; and, a wealth of resources to affect significant change through scalability
- **SMEs** – drivers of innovation; and, a strong moral compass to influence business decisions and a deep understanding of local issues
- **Consumers** – consumers *are* market demand; they need to understand how to purchase, use and recycle responsibly; and, be willing and committed to doing so.

William McDonough points out that the word “competition” is derived from the Latin word “competere”, meaning *strive together*. He used Olympic athletes as an analogy for how businesses could optimally approach sustainable development: “they get fit together...then compete” (TED, 2005). This approach complements GS/SA’s survey findings: collaborate to address systemic issues (disengaged investors & citizens, lack of enabling policy, resource scarcity), but move forward independently to develop sustainable products and services (GS/SA, 2012).

While all will benefit through collaboration in moving toward a sustainable economy, SMEs will also realize benefits to their individual organizations’ operations:

- As new policies are being developed, participation challenges specific to their businesses (and business size) can be considered–
- In truly partnering with multiple stakeholders, new opportunities for competitive advantage will become available–
- Knowledge transfer is facilitated with minimal cost
- Leveraging the resources and expertise of others reduces their business risk in developing new business models and introducing sustainable products. This also mitigates their primary challenge: resource poverty.

Conclusion

“The question becomes not ‘growth or no growth’ but ‘what do you want to grow?’” -

William McDonough, co-author Cradle to Cradle

There is a compelling argument for engaging SMEs in the SD battle due to SMEs' aggregate impact, organizational structures, and the economic function that they provide. Most SMEs rely heavily on their local economies, are intimate with their customers, and their owner-managers have stronger motivations than profit maximization. While sustainable development is a global issue, it requires local solutions. In addition, historically, the majority of disruptive innovations have been introduced by SMEs, so they are optimal since new business models will be required to transition to a sustainable economic structure. Governments, NGOs, and large corporations can facilitate the inclusion of SMEs through implementing policies and programs that take into consideration the resource poverty and lack of codification within SMEs.

There is an equally compelling argument for engaging SMEs for embracing SD. In addition to their local economic reliance, most SMEs have an innate sense of responsibility to their customers and employees. This provides the incentive to participate in the betterment of their communities and, in adopting sustainable principles, they are better positioned than larger firms to satisfy these stakeholders. When SMEs view current business models and their products and services through the sustainability lens, creativity and innovation is nurtured, generating new opportunities for these organizations to thrive. To play their part, SME owner-managers must display leadership by developing their competencies and those of their organizations through awareness, knowledge, and collaboration within networks and alliances.

To slay the twenty-first century Goliaths, twenty-first century tactics are required. While it has been demonstrated the SME Davids are critical warriors, today's giants cannot be slain by a slingshot alone. No one stakeholder has all the answers; no one business has all the resources. A collaborative approach between all stakeholders will most successfully develop solutions at the speed and scale necessary.

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