



CULTURAL INDOCTRINATION AND OPEN INNOVATION IN INTERNATIONAL BUSINESS

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ABSTRACT

This article explores the connection between cultural indoctrination (CI) and open innovation and its importance in an era of global hypercompetition. As organizations are confronted with the need to engage with stakeholders from a variety of different cultural backgrounds, the need to understand the ways in which cultural imperatives play into individual and collective performances becomes increasingly important. Based on an integrated literature review, this article examines the following eight factors included in CI: Child Development, Cultural Institutionalization, Cultural Intelligence, Language Structure and Acquisition, Social Learning Theory, Religion, Social Capital, and Values Orientation Theory (VOT). It is from these factors that a conceptual framework is developed for future application in theory and practice in open innovation in international business.

Keywords: Cultural Indoctrination, Competitive Advantage, Socialization, Open Innovation, International Business Theory.

Jel Codes: M10, M19.

ULUSLARARASI İŞLETMECİLİKTE KÜLTÜREL ENDOKTRİNASYON VE AÇIK YENİLİK

ÖZET

Bu makale, kültürel endoktrinasyon (CI) ve açık yenilik arasındaki bağlantıyı ve küresel hiper-rekabet çağındaki önemini araştırmaktadır. Örgütler, farklı kültürel geçmişlerden paydaşlarla etkileşimde bulunma ihtiyacı ile karşı karşıya kaldıkça, kültürel zorunlulukların bireysel ve kollektif performanslarda nasıl oynadıklarını anlama ihtiyacı da giderek önem kazanmaktadır. Entegre bir literatür taramasına dayanan bu makale, CI'de yer alan şu sekiz faktörü incelemektedir: Çocuk Gelişimi, Kültürel Kurumsallaşma, Kültürel Zeka, Dil Yapısı ve Edinimi, Sosyal Öğrenme Teorisi, Din, Sosyal Sermaye ve Değerler Yönlendirme Teorisi (VOT). Bu faktörlerden uluslararası işlerde açık inovasyonda, teori ve pratikte, gelecekteki uygulamalar için kavramsal bir çerçeve geliştirilmiştir.

Anahtar Sözcükler: Kültürel Endoktrinasyon, Rekabet Avantajı, Sosyalleşme, Açık Yenilik, Uluslararası İşletme Teorisi.

Jel Kodları: M10, M19.

1. INTRODUCTION

This article explores the connection between cultural indoctrination (CI) and open innovation in international business and its importance in an era of global hypercompetition. While it is established that scientific knowledge and technical expertise promote the wealth of nations in general, the scientific productivity of a country correlates more strongly with gross national income (GNI) per capita for advanced economies than does technological sophistication which is fundamentally more critical – and achievable – for developing nations (Jaffe, 2014). However, creativity is required for both areas with regards to open innovation which plays a critical role in achieving competitive advantage today (Chatzoglou & Chatzoudes, 2018; Ionescu & Dumitru, 2015). Later in this article we will briefly examine a current list of the most innovative cities in the world in connection with open innovation which is described below.

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Cultural origins can permit the prediction of individual behavior in an organizational environment under various situations (Trompenaars & Hampden-Turner, 2010; Hofstede, 1985, 2001; Hall, 1976). Therefore, as organizations are confronted with the need to engage with stakeholders from a variety of different cultural backgrounds, the need to understand the ways in which cultural imperatives play into individual and collective performances becomes increasingly paramount (Hannah et al., 2013). This need ultimately provides the ability for organizations to sustain a competitive advantage and to remain profitable over time (Chatterji & Patro, 2014; Teece, 2014; Barney, 1991). This article links cultural origins, open innovation, and competitive advantage via a Cultural Indoctrination (CI) conceptual framework presented below to encourage further research in open innovation and to advance other areas such as international business, education, management, and psychology. This is the major contribution of this work.

This article is organized below in the following manner. First is a Background covering the subjects of open innovation, realities in contemporary globalism, and competitive advantage. Second is an integrated Literature Review covering a range of work by established theorists in fields such as cultural anthropology, language structure and acquisition, social learning theory, cultural intelligence, social capital, and decision-making theory. Third is a Cultural Indoctrination Conceptual Framework that is a result of the Literature Review. Fourth is an Analysis section followed by Future Research Directions. Last is the Conclusion.

2. BACKGROUND

The globalization of today has placed many different demands on business, government, and society that simply did not exist even 10 years ago (WEF, 2018). There are four major global forces today which are largely behind this reality that are self-explanatory (McKinsey Global Institute, 2015): accelerating technological change worldwide, urbanization, a globally and rapidly aging population, and greater worldwide connections including trade, people, finance, and data. Disruptive technologies such as 3D printing, advanced robotics, next generation genomics, and renewable energy are also a significant part of the mix (McKinsey Global Institute, 2013). Anderson and Wong (2013) state that obtaining competitive advantage in the digital economy of the 21st century requires focusing on **intangible** factors such as firm strategy and positioning, radical innovation and first mover advantages, intangible resources and competencies, organizational ambidexterity, network effects and externalities, transaction cost efficiency, and relational optimality. *These factors will make destabilizing cycles of volatility more likely than ever before in this century* (McKinsey Quarterly, 2010). Associated effects include global inflation, drastically altered business and product life cycles, and the need for corporations to increase liquidity buffers for unexpected changes in global markets (Global Research Society LLC, 2018).

One key factor to overcome these real world issues is open innovation which is defined here (University of Cambridge Institute for Manufacturing, 2009): **Open Innovation**: A strategy by which organizations allow a flow of knowledge across their boundaries as they seek ways to enhance their innovation capability. de Jong, Marston, and Roth (2015) have established eight tests for innovation which can be used within the context of this article: Aspire, Choose, Discover, Evolve, Accelerate, Scale, Extend, and Mobilize. There is some empirical evidence that potentially demonstrates how these tests are met can depend largely on the creativity and innovation of the executives and managers involved based on their domestic *and* international experiences as well as language structure (Godart et al., 2015; Berman, Mudambi, & Shoham, 2017; Luring & Selmer, 2012). The CI conceptual framework below attempts to support such studies further by investigating the following areas: Child Development, Cultural Intelligence (CQ), Language Structure and Acquisition, Social Learning Theory, Cultural Institutionalization, Religion, Social Capital, and Values Orientation Theory (VOT).

These factors were carefully selected via an integrated literature review that covered psychology, human resource management, sociology, and organizational theory, among others. They were chosen because other factors involved in human behavior (e.g., personality) were not deemed to have as significant an impact as the ones chosen based on the results from the literature review that long preceded the development of this article. In any case, it is important to reiterate here that scant literature exists regarding CI or even its connection with other aspects of human activity such as architecture, business, or sociology (see Koç, Claes, & Christiansen, 2016 and Christiansen & Koeman, 2015).

The reader should consider this definition of CI before continuing with the Literature Review: *Cultural Indoctrination (CI) is the process of inculcating ideas, attitudes, beliefs, and cognitive strategies during the*



transfer of cultural traditions from one generation to the next with the expectation that such traditions will be practiced and not questioned in the future.

The major contribution of this article to the extant literature is to provide a springboard for future research which can have an impact on a variety of additional fields such as homeland security, information systems, or international sales & marketing (Bartunek, 2007). This work is not designed to be an empirical piece with specific solutions or answers; instead, that effort is left to those researchers who will use the conceptual framework for that purpose (see Bloom et al., 2012; Mudambi et al., 2012).

3. LITERATURE REVIEW

3.1. Major Theories Pertaining to CI

The following theorists are all certainly highly regarded individuals in their particular fields; however, none of them examine or connect their work with the topic of CI. Following is a summary of their major, relevant contributions for the CI conceptual framework below.

The cultural anthropologist Clyde Kluckhohn (1949, 1951, 1962) argued that humans share biological traits and characteristics which form the basis for the development of culture and that people normally believe their own cultural beliefs are natural, but consider those of others as inferior or abnormal (Hills, 2002). Building on Kluckhohn's theory were Florence Kluckhohn and Fred Strodtbeck (1961) who developed three basic assumptions: 1) There is a limited number of common human problems for which all people must at all times find some solution; 2) While there is variability in solutions of all the problems, it is neither limitless nor random but it is definitely variable within a range of possible solutions; 3) All alternatives of all solutions are present in societies at all times but are differentially preferred. These assumptions formed the foundation of their Values Orientation Theory (VOT) which is incorporated into the proposed framework below because VOT is a culmination of the other factors involved in CI.

Dutch social psychologist Geert Hofstede departed from the anthropologists' interpretive methodology for comparing cultures by presenting the first large-scale quantitative study of national cultural dimensions via an extensive survey of 144,000 IBM employees in 50 countries and three multi-country regions (Hartmann, 2012). Using factor analysis on the data, Hofstede (1980) developed four dimensions of culture: 1) power distance; 2) individualism vs. collectivism; 3) masculinity vs. femininity; and 4) uncertainty avoidance. He later added a fifth dimension: long-term vs. short-term orientation. Hofstede's work continues to be the foundation of cultural studies or dimensions as it remains the most highly cited in the extant literature. However, his work has been challenged or enhanced by a number of other notable theorists such as Schwartz (1994, 1999), Triandis (1995, 1996, 2002), Nakata (2000), Kirkman, Lowe, and Gibson (2006), and Trompenaars and Hampden-Turner (2010).

Decision-making is a multivariate and complex endeavor that can be greatly influenced by cultural behaviors and is a critical business activity in today's global hypercompetition due largely to technology (Ang et al., 2007; Gates & Hemingway, 1999; Drucker, 2002). How well this core function is conducted can significantly alter corporate success in the long-term (Hannah et al., 2013). Styhre et al. (2010) argue that uncertainty in industries is leading to more risk-taking in companies which, in turn, is affecting decision-making quality, cost, and speed. Game theory, which simply stated is a mathematical model of optimality considering benefits less costs in interaction between participants, can assist in decision-making to capture strategic situations of the involved parties and their mutual behaviors (Küçükmehtemoğlu et al., 2010). Dadkhah (2011) stresses that many mathematical theories in economics and industrial organization require modeling the behavior and interactions of many decision-makers.

Şen (2013) believes organizations of all types must adopt globalization patterns for their decision-making success. However, these must be based on effective, rational, logical, and systematic treatment of all possible inputs via fuzzy logic modeling which involves the development of models used for decision-making under uncertainty. If human decision-making is modeled as a search for global optimization simply by using rigorous mathematical rules, it will be incomplete in terms of offering a fair representation of reality. Therefore, it is necessary to consider qualitative as well as quantitative issues regarding corporate decision-making in an era of hypercompetition (Verplanken & Holland, 2002). Cultural factors based on CI is at the center of effective decision-making as is incorporated into the framework below.



Cultural intelligence (CQ) remains an emerging field (Gelfand et al., 2008) that includes four subdimensions: metacognitive, motivational, cognitive, and behavioral (Earley & Ang, 2003; Van Dyne et al., 2012). CQ has a definite impact on an organization's "financial bottom line" (Chen et. al., 2012), so its importance within the context of this article cannot be underestimated due to the effects of global hypercompetition on operations. Templer et al. (2006) state that contemporary globalism highly encourages mobility of labor across cultural and national boundaries, but operating in different cultures is a major obstacle for most people (Redmond, 2000). Therefore, motivational CQ is of particular note as individuals with high motivational CQ levels are more likely than others to engage in the intercultural interactions that all of us face increasingly both at home and abroad via work and pleasure (Black et al., 1991; Deci & Ryan, 1985; Molinsky, 2007). Dessler (2012) notes that extensive empirical research indicates there are high "hidden costs" of hiring people with inappropriate backgrounds to engage them in assignments which require finesse in multicultural settings.

Language structure differs significantly with regards to time, gender, hierarchies, and individual or collective emphases (Berman, Mudambi, & Shoham, 2017). Whorf (1956) was a pioneer in the study of linguistics and the role of languages in forming societies and their behaviors. Since his time some significant studies have been published on the role of language in various areas of human behavior (e.g., Chen, 2013; Brannen, Piekkari, & Tietze, 2014; Santacreu-Vasut, Shenkar, & Shoham, 2014; Tenzer & Pudelko, 2017). One example regarding language structure can be found in the Japanese *katakana* writing system which was originally developed in the ninth century and eventually used for official government documents and religious texts (Seely, 2000). The *katakana* syllables permitted the easy assimilation of foreign concepts and loanwords into the Japanese language, especially from Dutch, English, and German, which was largely credited with allowing Japan to develop its enormous military capabilities for World War II following the Meiji Restoration of 1868.

Language acquisition has abundant extant literature (e.g., Blume & Lust, 2017; Loewen & Sato, 2017; Christiansen, Chatter, & Culicover, 2016). According to the concept of linguistic relativity, or more commonly known as the Sapir-Whorf Hypothesis, the manner in which people think is strongly affected by their native language(s). This concept has both strong and weak aspects; the former is associated with language determining thought while the latter is associated with language limiting thought. However, this hypothesis has been challenged repeatedly over the years and remains a highly controversial subject in the field of linguistics. Gumperz and Levinson (1996) reinvestigated linguistic relativity in light of new evidence within the fields of anthropology and cognitive science while Wolff and Holmes (2011) concluded there is growing support for the view that language has a profound effect on thought. Other related works on this subject include Leavitt (2015) and Everett (2016).

It is worth briefly mentioning three additional concepts regarding language that was considered when developing the CI framework:

- **Central Language Hypothesis** by Buğa (2016) states that in the minds of bilingual and multilingual individuals one language is more suppressive than the other(s) as it dominates reflexes, emotions, and senses as it is located at the center of the limbic cortex of the brain.
- **Critical Period Hypothesis** by Lenneburg (1967) suggests there is a sensitive or critical period in humans to acquire a first language, usually before the onset of puberty in order for the language acquisition to develop fully. This work remains a classic source on this topic although it is still a highly controversial subject.
- **Age Constraints on Second Language Acquisition** by Flege, Yeni-Komshian, and Liu (1999) evaluated the Critical Period Hypothesis for Second Language (L2) Acquisition and found mixed results regarding support for the Critical Period Hypothesis.

Social capital has earned an increasingly important place in economic development over the past 20 years (Cartwright & Singh, 2014). Sobel (2002) states that social capital is an attribute of an individual in a social context which can be transformed into conventional economic gains. Social capital varies from country to country, and can also act as a conduit for non-economic benefits (Woolcock, 1998). Nonetheless, an individual's overall socioeconomic status can still depend greatly on her or his social capita, so it is included in the CI framework as it relates to socioeconomic status.

Religion can influence economic growth and economic growth can influence religiosity (Barro & Mitchell, 2004; Barro & McCleary, 2003; McCleary, 2007). However, Chandan (2014) notes that since Hofstede's



(1980) national culture dimensions and economic growth rates vary among nations, religion alone is not sufficient to explain (for example) higher economic growth of emerging markets. Therefore, due to these conflicting yet established viewpoints, religion is included in the proposed CI framework as an important mediating factor.

Bandura's (1977) social learning theory states that learning is a cognitive process which occurs in a social context via observation or direct instruction. Possibly the most influential theory of learning and development, Bandura's added a social element to the field in which he argued that people can learn new information and behaviors by observing other people. This aspect is included in the proposed framework due to the increased interaction between people as the world becomes more interconnected—especially via technology (Gates & Hemingway, 1999; McKinsey Global Institute, 2015).

Bronfenbrenner's ecological systems theory (Papalia & Feldman, 2012) explains how everything within an individual and her or his physical environment impacts and influences a person's growth and development. This is in line with Erikson's (1993, 1994) extensive work on childhood, identity, and the life cycle. A developmental psychologist who served as a professor at Harvard and Yale Universities even though he lacked even an undergraduate degree, Erikson established the eight stages of life-stage virtues ranging from infancy to old age. These stages include: basic trust vs. basic mistrust, autonomy vs. shame, purpose, competence, fidelity, intimacy vs. isolation, generativity vs. stagnation, and finally ego integrity vs. despair. All of these stages are critical aspects of CI and are included in the child development section of the proposed framework.

Institutionalization, initiation, and indoctrination are often confused with education and training (McDonough, 2011), although some theorists believe all education emits from a particular ideological perspective with the intent that a person will adopt that ideology. Hocutt (2005) states that current disputes in academia raise the philosophical question regarding how education differs from indoctrination, and it is the author's viewpoint there is a definable difference between the two.

3.2. Indoctrination

It might be surprising to read that nearly 100 years ago the terms indoctrination and education were considered nearly synonymous (Gatchel, 1972), although there should be little doubt today this is simply not the case. Indoctrination covers multiple aspects of human existence such as rationality, moral education, religion, freedom, and even intentions (Snook, 1972). The term often carries the negative connotation of "brainwashing" which was first coined by Edward Hunter in 1950 from the Chinese word "hsi nao" or "cleansing of the mind" (Winn, 1983), but this is not the context in which the word "indoctrination" is used in this article.

An etymological investigation of "indoctrination" shows the following (Gatchel, 1972): 1) the word indoctrination meant in its incipient phase the implanting of doctrines. In the Middle Ages under the autonomous control of the Roman Catholic Church, medieval European education became synonymous with the implanting of Christian doctrine; 2) although indoctrination originally indicated a liberal concept of implantation, it gradually assumed the connotations of a coercive type of education; 3) since about the 17th century, increasing expression of and experimentation with concepts of democracy have brought with them considerably different ideas about Education; and 4) the present truncated definitions of indoctrination make it inadequate to describe the highly developed processes of democratic education. Another word—enculturation—shows promise of filling this need, but even 'enculturation' carries some implications of 'indoctrination's' limitations.

4. CULTURAL INDOCTRINATION CONCEPTUAL FRAMEWORK

Cultural norms vary widely and possess both concrete and abstract components such as clothing acceptable for certain occasions or religious beliefs, respectively (Hills, 2002). As mentioned in the Introduction, cultural origins can permit the prediction of individual behavior in an organizational environment under various situations. Ang and Inkpen (2008) state there is an increasing consensus regarding the complexity of managing cross-cultural interactions effectively, and cultural adaptation is an important dimension of this complexity (Yamazaki & Kayes, 2004). Campbell et al. (2012) proposed a comprehensive framework of human capital-based advantage which can be considered with the proposed CI conceptual framework because scholars have acknowledged that general skills may actually lead to (higher) organizational-level performance. The

connection here is that CI is an integral part of human capital within the context of open innovation as described earlier.

Because there are extensive, long-term changes occurring in the world today, such radical changes mean organizational management can no longer rely on traditional and tangible sources of value creation such as land, labor and capital, and raw material to drive competitiveness; instead, these entities must now embrace “intangibility” such as that found in open innovation of which knowledge is at the heart (Andersen & Wong, 2013; Oberg & Alexander, in press). CI is one of those intangibles, and the proposed framework represents one link between global hypercompetition and open innovation theory and practice. Engaging both scholars and practitioners in the further development of the proposed framework below via effective collaboration is suggested as it is no secret the research-practice gap is widely recognized and lamented (Bansal et al., 2012).

Ultimately, the transitional mechanism from the individual to the organization is to answer from the proposed conceptual framework above how an organization mediates or moderates, enhances or restrains the CI of an individual? What systems, routines, and processes that comprise the organization work upon which individual characteristics, traits, and beliefs? What among dozens of personal variables will the organization influence so the macro-level issues (e.g., the organization-environment interaction) can be addressed? These and other transitional questions are to be answered by future analysts; namely, scholars and practitioners collaborating together in empirical research efforts.

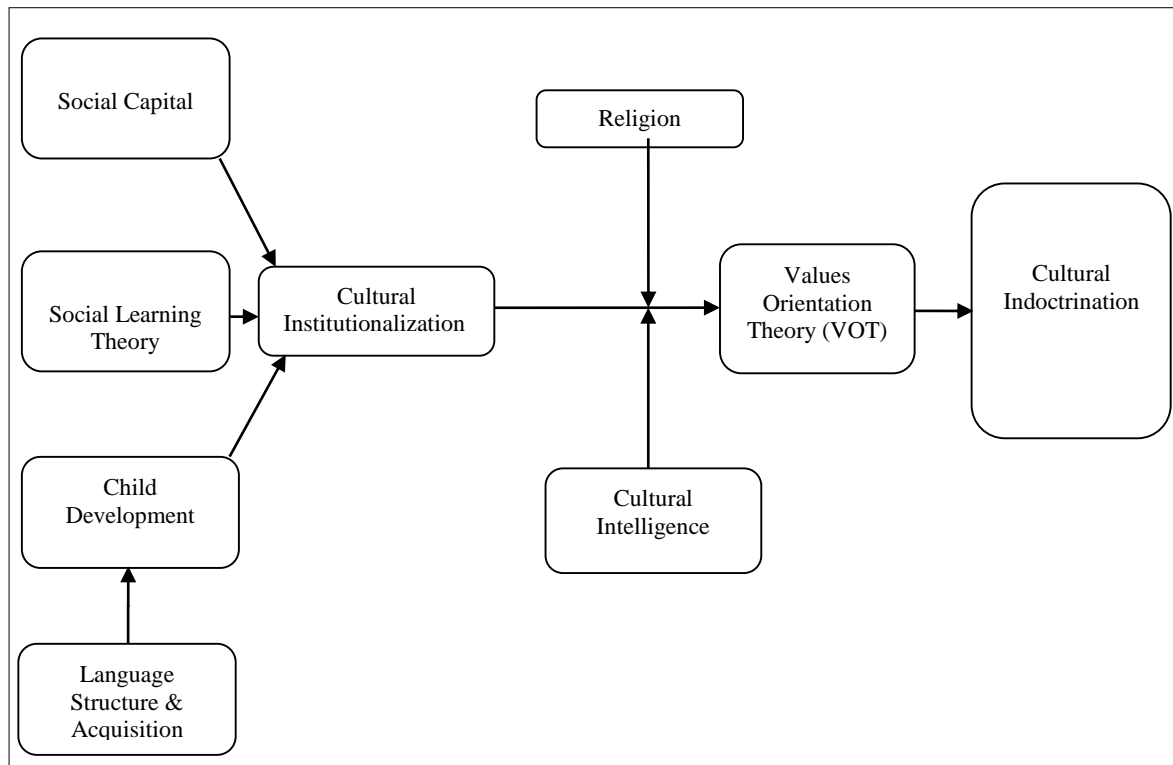


Figure 1. A Conceptual Framework for Cultural Indoctrination (CI)

5. ANALYSIS

Open innovation is a strategy that requires the free flow of knowledge to improve the organization’s innovative capabilities which, in turn, enhances competitive advantage. Porter’s original 1990 study, *The Competitive Advantage of Nations*, was a major breakthrough regarding the differences in economic development between 10 international trading countries and their natural competitive advantage in various industries such as car manufacturing and textiles. Translated into 12 languages and now in its eleventh printing, the book has transformed our concept of sustainable prosperity in the modern global economy. While Porter’s “diamond



theory” offers a model to help understand the competitive position of a nation in global competition, it does not consider the tenets of cultural indoctrination presented in this article. The same can be said regarding the works of relevant others. Herein lies an opportunity for the CI framework above to be applied constructively (e.g., Koç, Claes, & Christiansen, 2016).

Open innovation began in the 1980s in response to transcending the traditional “closed innovation” practices of manufacturing firms at the time. Tidd and Bessant (2009) state that open innovation is driven by the following factors: cost reduction for technology development, promoting shared learning, reducing lead times for product or service development, and achieving economies of scale. Bessant and Moslein (2011) forward that the ability to exploit shared creativity is a key component of the open innovation context. It is here that the author contends the CI framework is effective in understanding how to better cultivate such “shared creativity” today, especially in Research and Development (R&D)-intensive industries that require close collaboration – often across national boundaries – to be successful. In an era where companies have employees and customers from different cultural and linguistic backgrounds both domestically and internationally, the role of languages within the CI framework assumes particular importance.

Berman, Budambi, and Shoham (2017) conducted empirical research suggesting there is an association between language structure and innovation. Their study is purportedly relevant to both theoretical and practical aspects of innovation and international business; nonetheless, they state much additional research is needed and the author forwards that such research consider the CI conceptual framework from which to launch this effort.

Knowledge management or KM, being a major component of open innovation is rather dependent on the social and political values of a given country. An established discipline since 1991, KM is supposed to be a strategic organizational objective (Nag & Gioia, 2012). However, both author business experience and academic research indicates both organizational and national culture can highly affect how KM is employed (Leidner, Alavi, & Kayworth, 2006; Kor & Mayden, 2013; Iles, Ramgutty-Wong, & Yolles, 2004). The CI framework is a potential a tool to better understand how the backgrounds of employees involved in open innovation and KM, among other fields, can improve the flow of information throughout an organization for enhanced performance as the framework incorporates more robust variables than are common in many other cultural models (Bennardo & de Munck, 2014; Kristiansen & Dirven, 2008).

The CI framework, open innovation which includes KM, and competitive advantage form a foundation from which organizations can develop sustainable business development and related programs for long-term success. The list below shows in order the world’s most innovative cities based largely on commercial breakthroughs by world-class multinational companies and ground-breaking research by universities which share a critical mass of knowledge and expertise (WEF, 2018b):

- New York, New York, USA
- Tokyo, Japan
- London, England, United Kingdom
- Austin, Texas, USA
- Berlin, Germany
- Boston, Massachusetts, USA
- Stockholm, Sweden
- Shenzen, China
- Banglaore, India

The reader will want to investigate these cities in detail why and how they continue to dominate this list and consider the CI framework in future analysis and development.

**6. FUTURE RESEARCH DIRECTIONS**

Academics and practitioners should attempt to enhance the CI framework by developing an algorithm, possibly via fuzzy logic or Structural Equation Modeling (SEM), to explain mathematically how the model can work in practice or in academia. Second, additional research into motivational CQ is suggested as this aspect of CQ appears to be the most promising (and manageable) within the CI framework with regards to improving and sustaining organizational “financial bottom lines”. Last, further research into how language structure affects innovation would be highly beneficial to scholars and practitioners alike. In connection with this subject it would be worthwhile to include study of multilinguals and Third Culture Individuals (TCIs).

7. CONCLUSION

The global marketplace today is characterized by profound social, economical, and technological changes (Denktas-Sakar, Karatas-Cetin, & Saatgioğlu, 2014). In addition, contemporary globalism is redefining how people work together (Thomas & Rablin, 1995). Therefore, one of the consequences of today’s globalism is more contact between cultures than has ever been common. Examples can include interacting with people across cultures as expatriates, managers, business travelers, and global leaders (Bücker et al., 2014). In this article, we have covered how CI can potentially affect such interaction (Tolentino, 2008; Hofstede, 1985) and provided a proposed framework for future research in open innovation.

This article has provided a Conceptual Framework that includes an integrated Literature Review in areas deemed pertinent such as cultural anthropology, social learning theory, language structure and acquisition, cultural intelligence, social capital, and decision-making. Decision-making should be highlighted here because it is how executives engage in this activity that has a huge bearing on the performance of open innovation. Executives must make decisions in increasingly complex situations today that involve dynamic social systems and networks, and these changing situations create an unpredictability previously unknown (Hannah et. al., 2013).

As previously mentioned, scholars should view this article as an initial foundation upon which to base future empirical and theoretical investigation and development, preferably in collaboration with practitioners (see Mohrman & Lawler, 2012; Waldman et al., 2012; Mohrman et al., 2001).

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KEY WORDS AND DEFINITIONS

Competitive Advantage: the attribute that allows an organization to outperform its competitors. A competitive advantage may include access to natural resources, highly skilled labor, geographic location, high entry barriers, and access to new technology.



Cultural Indoctrination: The process of inculcating ideas, attitudes, beliefs, and cognitive strategies during the transfer of cultural traditions from one generation to the next with the expectation that such traditions will not be questioned but practiced in the future.

Disruptive Technologies: Technologies which significantly alter the manner in which businesses or entire industries operate.

Language Acquisition: The process by which humans acquire the capacity to perceive and comprehend language, as well as to produce and use words and sentences to communicate.

Fuzzy Logic: Fuzzy logic is an approach to computing based on “degrees of truth” rather than the usual “true or false” (1 or 0) Boolean logic on which the modern computer is based.

Open Innovation: A strategy by which organizations allow a flow of knowledge across their boundaries as they seek ways to enhance their innovation capability.

Sustainability: The capability to continue a business organization or process over a long period of time at an acceptable rate of profitability.