European Management Journal xxx (2016) 1–17

Contents lists available at ScienceDirect

European Management Journal

journal homepage: www.elsevier.com/locate/emj

Assessing the measurement invariance of the four-dimensional cultural intelligence scale across countries: A composite model approach

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ARTICLE INFO

Article history:
Received 25 January 2016
Received in revised form
3 June 2016
Accepted 7 June 2016
Available online xxx

Keywords:
Cultural intelligence
Measurement invariance
Partial least squares
PLS-SEM
MICOM
Composite models
Expatriation intention

ABSTRACT

Over the past decade, the cultural intelligence construct and its underlying dimensions have been used in a number of studies. Prior research has tested the determinants and outcomes of cultural intelligence, using pooled data from different countries and cultures, and has compared the results across contexts. However, these studies often disregarded measurement invariance, which is a necessary requirement for such analyses. We assess the measurement invariance of the commonly used four-dimensional cultural intelligence scale across five countries (China, France, Germany, Turkey, and the U.S.) by means of a composite model logic, using partial least squares structural equation modeling (PLS-SEM). Our results question the scale's dimensionality concerning China and France, and reveal an item set that is invariant across the other countries. Our findings indicate that researchers should be aware of the potential lack of measurement invariance regarding the standard measurement of cultural intelligence. They should therefore be cautious when comparing the results of cross-country and cross-cultural research.

1. Introduction

Interacting and communicating effectively with people from diverse cultural backgrounds are essential skills in business life and becoming even more important in a globalized world context. Thus, researchers and practitioners are increasingly interested in developing a better understanding of the determinants and outcomes of individuals' cultural intelligence (CQ), which refers to "a person's capability to adapt effectively to new cultural contexts" (Earley & Ang, 2003, p. 59). CQ has been researched in multiple areas, particularly in the assessment of cross-cultural and intercultural competences—for an overview, see Ang and Van Dyne (2008), Leung, Ang, and Tan (2014), and Matsumoto and Hwang (2013).

To properly evaluate CQ's impact on the perceptions, attitudes, and behaviors of individuals across countries and cultures, researchers require a clear understanding of how to measure CQ. Most prior studies in this field draw on Ang, Van Dyne, and Koh's (2006) 20-item CQ scale (see also Leung et al., 2014; Matsumoto & Hwang, 2013), with its four underlying dimensions: behavioral CQ, cognitive CQ, metacognitive CQ, and motivational CQ. The scale was developed in the U.S. and Singapore (Ang, Van Dyne, & Koh, 2006; Ang et al., 2007; Van Dyne, Ang, & Koh, 2008), but translated versions have been used in dozens of studies in non-English-speaking countries, such as China (Bücker, Furrer, Poutsma, & Buyens, 2014), Germany (Remhof, Gunkel, & Schlägel, 2013), and Turkey (Şahin, Gürbüz, Köksal, & Ercan, 2013). Numerous studies have applied the scale to compare CQ's effects across countries or cultures (Bücker, Furrer, & Peeters Weem, 2012; Ang et al., 2007; Engle & Nehrt, 2012; Engle, Dimitriadi, & Sadrieh, 2012; Imai & Gelfand, 2010), or have used it on pooled samples comprising individuals with different cultural backgrounds (e.g., Elenkov & Manev, 2009; Huff, 2013; Huff, Song, & Gresch, 2014; Lin, Chen, & Song, 2012; Malek & Budhwar, 2013; Ramalu, Rose, Kumar, & Uli, 2010). While these studies' findings contribute to a better understanding of CQ, researchers often inadequately examine the CQ scale's validity in country settings that differ from the context in which it had been developed and initially tested. Before comparing the results of, or pooling data from different countries and cultures,

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http://dx.doi.org/10.1016/j.emj.2016.06.002
0263-2373/

researchers need to establish measurement invariance (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). Measurement invariance refers to "whether or not, under different conditions of observing and studying phenomena, measurement operations yield measures of the same attribute" (Horn & McArdle, 1992, p. 117). If measurement invariance is not established, the results of cross-country and cross-cultural CQ studies cannot be readily compared, because the similarities and differences in prior findings could be a reflection of the study participants' diverse understandings and interpretations of the CQ scale's items rather than robust empirical evidence. In fact, lacking measurement invariance could explain the differences in CQ's effects in prior research. For instance, using a sample of Turkish respondents, Şahin et al. (2013) researched the effect of openness to experience (i.e., individuals' willingness to explore, consider, and tolerate new and unfamiliar experiences and ideas) (McCrae & Costa, 1987) on CQ. They found a weak effect on the cognitive CQ dimension (0.15) and a medium effect on the behavioral CQ dimension (0.47). In contrast, Oolders, Chernyshenko, and Stark (2008) offer evidence of openness to experience having a strong effect on cognitive CQ (0.31) in New Zealand, while Varela and Gatlin-Watts (2014) find this has a weak effect on behavioral CQ (0.04) in the U.S. Given the increasing internationalization of European business and in light of the migration crisis, the general business environment for European firms will change fairly drastically. Firms face the challenge to adapt to culturally more diverse customers, employees, and business partners. A precise assessment of CQ would for instance provide firms with the opportunity to identify potential areas of improvement in their organization, thus allowing for early interventions to foster the development of CQ in operations that would benefit from improved CQ. A better understanding of the measurement properties of CQ across different national cultural backgrounds is required to evaluate this construct's true potential to assess the links between firms' cross-cultural competencies and different variables that are of managerial relevance.

While the need to establish measurement invariance prior to undertaking cross-country or cross-cultural comparisons has long been acknowledged in the international management literature (e.g., Harzing, Reiche, & Pudelko, 2013; Hult et al., 2008), only a few studies have assessed the CQ scale's measurement invariance (see Table A.1 in the Appendix). These studies primarily focused on the invariance across time (Ang et al., 2006; Rosenblatt, Worthley, & MacNab, 2013; Varela & Gatlin-Watts, 2014), which is an important requirement when analyzing CQ in a longitudinal study design. Only Ang et al. (2007) and Bücker et al. (2012) have examined measurement invariance across countries, but focused on just two sets of countries (Singapore vs. the U.S. and Netherlands vs. China). Further, both studies relied on covariance-based structural equation modeling (CB-SEM), which follows a common factor model approach in the estimation of the construct measures. Recently, however, scholars have started questioning the reflex-like application of common factor models, emphasizing that the composite model—as implemented in partial least squares SEM (PLS-SEM)—offers a more general and potentially more realistic approach to measurement (e.g., Rigdon, 2012; 2014; Sarstedt, Hair, Ringle, Thiele, & Gudergan, 2016). Owing to its greater flexibility concerning measurement and model estimation (e.g., Hair, Hult, Ringle, & Sarstedt, 2016), PLS-SEM has gained prominence in international business research (Richter, Sinkovics, Ringle, & Schlägel, 2016), strategic management research (Hair, Sarstedt, Pieper, & Ringle, 2012), and related fields (e.g., Hair, Sarstedt, Ringle, & Mena, 2012; Peng & Lai, 2012; Ringle, Sarstedt, & Straub, 2012). Thus, assessing the CQ construct's measurement invariance by means of composite-based PLS-SEM is both timely and warranted.

Our main research question is whether measurement invariance can be established for the CQ scale between five countries from distinct cultural clusters—including Germanic and Latin Europe—with different characteristics in terms of formal institutions (rules, laws, and regulations), informal institutions (cultural norms and values) (Berry, Guillén, & Zhou, 2010), and institutional environments. In answer to recent calls to examine the CQ measures' psychometric properties more closely (e.g., Bücker, Furrer, & Lin, 2015; Fink & Mayrhofer, 2009), we assess the cross-country measurement invariance of Ang et al.'s (2006) standard 20-item, four-dimensional scale of CQ. Applying Henseler, Ringle, and Sarstedt's (2016) recently proposed measurement invariance of composite model (MICOM) procedure, we research CQ's effect on respondents' expatriation intentions across China, France, Germany, Turkey, and the U.S. In doing so, we extend prior studies that have investigated the CQ scale's measurement invariance across countries (Ang et al., 2007; Bücker et al., 2012) by explicitly considering a composite modeling approach to measurement and examining a larger number of countries. Further, we contribute to the literature on PLS-SEM by offering an illustration of the MICOM procedure's use across multiple countries, documenting the problems that arise when comparing translated versions of a scale across multiple countries in an effort to establish measurement invariance.

We research the CQ scale's measurement invariance in the context of expatriation intentions. While expatriates have become an important human resource for internationally active firms (e.g., Chang, Gong, & Peng, 2012; Choi & Johanson, 2012; Fang, Jiang Makino, & Beamish 2010), little is known about the reasons for individuals becoming expatriates or deciding to not do so (e.g., Felker & Gianecchini, 2015; Vaiman, Haslberger, & Vance, 2015). Prior studies have focused on the roles of aspects such as international experience (Tharenou, 2003, 2008) and personality traits (Mol, Born, Willemsen, van der Molen, & Derous, 2009) when explaining expatriation intentions. However, we still lack research on the effects of cross-cultural knowledge or the motivation to use this knowledge on individuals' expatriation intentions. Recent surveys (e.g., Development Dimensions International, 2016; ManpowerGroup, 2016) report that CEOs perceive cultural competence and a global mindset as some of the most important leadership skills for 21st century managers. At the same time, these surveys also reveal that managers perceive working with people from different cultural contexts as one of their weakest skills. Thus, developing a better understanding of CQ's roles is essential when predicting whether future managers will consider pursuing an international career, including being an expatriate manager.

Our results cast doubt on the CQ scale's universal usefulness across countries, most notably in China and France. The original scale items need to be adjusted for Germany, Turkey, and the U.S. so as to meet the minimum measurement quality requirements. When using a reduced CQ scale, further comparisons across these three countries underline motivational CQ's roles and, to a lesser extent, cognitive CQ's roles in shaping expatriation intentions. Metacognitive CQ and behavioral CQ have no effects. Mirroring calls for further research (Andresen & Margenfeld, 2015; McEvoy & Buller, 2013; Shaffer, Kraimer, Chen, & Bolino, 2012; Vance, 2005), our results also offer a nuanced understanding of CQ's influences on expatriation intentions in different national settings.

2. Theoretical background

2.1. Cultural intelligence: concept and dimensionality

Earley and Ang's (2003) concept of CQ is rooted in Sternberg's (1999) theory of successful intelligence, according to which "… intelligence is the ability to achieve success in life, given one's

Please cite this article in press as: Schlägel, C., & Sarstedt, M., Assessing the measurement invariance of the four-dimensional cultural intelligence scale across countries: A composite model approach, European Management Journal (2016), http://dx.doi.org/10.1016/j.emj.2016.06.002