

# Measuring Human Capital in Small and Medium Manufacturing Enterprises: What Matters?

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Accepted: 9 March 2017  
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**Abstract** This study proposes a framework that quantifies and integrates both the tangible and intangible aspects of HC to comprehensively measure the overall level of human capital index (HCI) in small and medium manufacturing enterprises (SMEs). Data were collected from 100 SME experts through the use of questionnaires in two stages. The data collected were first, used for selection purpose, and second, for the prioritization of relevant dimensions and sub-dimensions of HC. The analytic hierarchy process was adopted to prioritize and assign dimension and sub-dimension weights to HC to derive the HCI. The results indicate that not all dimensions and sub-dimensions of HC are important for the HCI. Namely, the HCI can be best represented by 9 dimensions and 35 sub-dimensions of HC. The core dimensions are experience, skills, education, abilities and training. Indeed, within experience, the main sub-dimensions are work-related experience and organizational tenure. The results suggest the importance of experience relative to skills and education. The proposed framework can also be applied to derive industry specific HCI.

**Keywords** Human capital index (HCI) · Small and medium enterprises (SMEs) · Analytic hierarchy process (AHP)

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## 1 Introduction

Human capital (HC) has resurfaced as an important topic of debate among policy makers and managers. Indeed, firms, regardless of size, consider HC to be important to attain competitive advantage (Cricelli and Grimaldi 2008; Lepak and Snell 1999; Nakamura 1981), and to sustain their performance (Ambrosini, Bowman, and Collier 2009; Becker 1962; Mincer 1958; Schultz 1961; Wernerfelt 1984). Similarly, following from the resource based view, firms consider HC as one of the capabilities that is distinct to firms; it is valuable, rare, non-substitutable and non-imitable (Delery and Shaw 2001; Newbert 2007). Since HC is linked to employees, its measurement is essential to enable firms to put into place exigent management control issues (Widener 2004).

Despite the importance of HC, measuring it has been difficult and the literature has at best produced inconsistent measurements of HC. Many studies have used proxies for HC. Further, there are limited attempts to comprehensively define and construct a HCI that includes both tangible and intangible aspects of HC. Most studies on HC-firm performance often reach contradictory results because of the unavailability of a comprehensive measure of HC. A significant number of studies suggested positive relationships between HC with productivity, export and innovation of firms (Becker 1962; Coff and Kryscynski 2011; Ployhart et al. 2006; Prahalad 1983), while others show otherwise. By reviewing past studies, Newbert (2007) concluded that only 33 percent of those studies supported a positive association between HC and firm performance. Similarly, Slaughter et al. (2007) highlighted that the failure in taking into account firm specific and general HC has led to mixed evidence in the performance-based studies. Given the central role of HC in any organization, the question arises as to how to measure HC, and what dimensions of HC matter to for measuring explicit knowledge (Guthrie 2001; Tayles et al. 2007). It is noted from previous literature that initial measures of HC seemed to focus solely on efficiency and cost. Traditional measures were highly criticized as they were considered short term, lagging behind and backward-looking. This gave rise to the development of the HC metrics (Garavan et al. 2001; Gates and Langevin 2010). This new concept urged organizations to apply non-financial performance measures for performance management such as the Balance Score Card (Kaplan and Norton 1996) and the Skandia's HC indicator (Edvinsson and Sullivan 1996). These scholars then illustrated how performance is produced within an organization, and how its various filaments are interconnected. The conclusion was that HC s contribute in a radical way towards attaining key objectives of performance. Thus, HC measures have evolved beyond just as efficiency indicators, with adapted measures for more complicated jobs (Gates 2004).

HC is generally defined as the accumulation of competencies, knowledge and skills to carry out work, which can produce economic value (Wright et al. 1995). Scholars that focused on the multi-facets of HC, developed various measures towards this end (Becker et al. 2001; Bontis and Fitz-Enz 2002; Calabrese et al. 2013; Edvinsson and Sullivan 1996; Kaplan and Norton 1996). Yet, some fundamental problems prevail. First, the prominent issue is that the concept of HC is still ambivalent, and most researchers have attempted to analyze HC using conventional measures based on tangible resources. Second, the existing measures of HC do not fully encapsulate major qualitative and quantitative dimensions of HC (Chen et al. 2004; Krueger and Lindahl 2000). Third, it is important to know which dimensions of HC are critical, to identify its optimum level. In this context, the aim of this study is to develop a comprehensive framework that accounts for both the qualitative and quantitative aspects of HC, by weighting the important dimensions of HC. Taking into