

Technical report

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Human capital theory:

assessing the evidence for the
value and importance of people to
organisational success

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Foreword

As the CIPD works to evolve the HR profession, there are important questions that must be answered as to the value and nature of the relationship between people and work. Scholarship in accountancy, and more recently in the HR and management domains, has conceptualised value as the knowledge, skills and abilities, or human capital, of the workforce. These characteristics and attributes, in their purest form, are the crucial inputs from which value is generated by organisations. Human capital is therefore a fundamental concept for the HR profession to understand if organisations of the future are to deliver long-term success.

This technical report examines the academic perspective on human capital, its definition and the fundamental concepts that underpin its conceptual value. By reviewing published academic literature, this report acts as an evidence base for the HR profession, by defining a clear line in the sand from which future research and investment in capability can grow. Complementing this report is an additional assessment of the measurement of people and human capital, commonly described as HR analytics, which considers the academic perspective on the process of measurement and reporting people data (Charlwood et al 2017). In combination, these technical assessments form part of the evidence for the evolving HR body of knowledge, the implications and synthesis of which forms part of the CIPD discussion report *Human capital analytics and reporting: exploring theory and evidence* (Houghton 2017).

Building the evidence base for the value and contribution of people to business success is central to enhancing the capability of HR professionals to build the conditions to create more effective decision-making. Evidence such as this, written from the perspective of leading academic thinkers, is one vital source of insight that can help to improve the capability of the profession. This report offers a thorough and clear assessment of the academic debate as to the nature of the value of people in organisations, and as such should be seen as an important contribution to the HR and people management body of knowledge.

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Executive summary

Oscar Wilde once said, *'A cynic knows the cost of everything, but the value of nothing.'* Indeed, the same can be said for organisations that view their workforce as a cost, rather than an asset to be nurtured and developed over time. Many modern-day organisations have now come to the realisation that it is the firm's intangible assets, such as the knowledge and skill of their employees, that is fundamental to creating value and attaining a sustainable competitive advantage over rival firms. Organisations today find themselves operating in a knowledge economy, and this raises many questions as to how firms can facilitate the creation, development and sharing of knowledge amongst its employees. Hence, the management and measurement of human capital (HC) has become an issue of great strategic importance.

Purpose: key questions

The purpose of this report is to consider how scholarship and academically published literature considers human capital in organisations, and to consider the relationship between human capital and concepts through human resources management, accounting and strategic management literature.

Two key questions informed the development of this research, namely:

- 1 What is human capital, social capital and intellectual capital, and how are they considered in published academic literature?
- 2 How do the accounting and human resources management domains consider the measurement of human capital? And how are these perspectives considered in published academic literature?

This report critically reviews the literature surrounding HC management with the aim of examining the contemporary academic perspectives on measuring human capital. It does this by drawing insight from a variety of academic perspectives. This involved reviewing the academic literature at both the individual and organisational level and underlining the factors that help create an environment where HC can thrive. At the individual level, this involved examining the antecedents which influence individual performance, such as motivational psychology and employee engagement, employee behaviour, talent management and career development. At the organisational level, issues such as capability development, firm governance, corporate leadership and organisational behaviour were considered. Moreover, in contrast to previous literature reviews on HC, this report takes a multi-level perspective and examines how both employee- and corporate-level capabilities intertwine to improve firm performance.

Summary of findings

The review also underlines the vital role social capital plays at both the individual and organisational level in terms of creating value and stimulating new knowledge and innovation. For instance, it has been highlighted that social capital is the catalyst that converts the knowledge of individuals into the knowledge of the organisation, and vice versa. The report also highlights the notion that in order to cultivate and develop HC, an organisation must be able to identify and measure how more recent initiatives impact upon

the development of HC within organisations. The report also underlines the observation that the measurement and reporting of HC becomes a fundamental knowledge source in itself for not only facilitating the development of HC within organisations but also predicting and sustaining HC performance in the longer term. Finally, the report emphasises the importance of linking contemporary operating strategies to the design and generation of HC metrics in order to improve organisational outcomes. The concluding sections of this report also discuss areas for future research in terms of measuring the interaction between human, social and structural capital, exploring the role of organisational teams and employee well-being in the relationship between HC development and firm performance and, finally, identifying how HC can be leveraged to facilitate organisational change.

Introduction

The rise of intangible resources and intellectual capital

The twenty-first century has witnessed the transition from the production economy to the knowledge economy, and there has been a paradigm shift in the way 'assets' are viewed within organisations. Traditionally, the long-held belief was that a firm's physical assets paved the way for economic success; however, as Becker describes, *'physical resources explain only a relatively small part of the growth of income in most countries'* (Becker 1964, p1). From a strategic management perspective, physical resources confer little advantage to organisations because they can be bought and sold on the open market with ease (Rothaermel 2012). In a knowledge economy, it is the intangible abilities and skills of the workforce and the knowledge inherent within the organisation's structures, routines, systems and processes which can contribute towards the knowledge capital of the organisation (Grant 1996a, Mahoney and Kor 2015). This knowledge capital is commonly referred to as a firm's intellectual capital (IC).

A firm's IC is made up of human, social and structural capital (innovation and process capital) (Edvinsson and Malone 1997). Human capital (HC), it can be argued, represents the foundational level of IC. HC not only plays a vital role in developing and creating new ideas and knowledge; it also facilitates social capital and the sharing of knowledge and ideas through internal relationships (Han et al 2014). HC also complements a firm's structural and innovation capital, creating new and unique knowledge, for example, a scientist developing or utilising a firm's patents (Mahoney and Kor 2015).

The inherent problem with HC, however, is that, unlike organisational capital that the firm owns (that is, patents, databases, and so on), HC can simply walk out the door and never return (Coff and Raffie 2015). Hence, one can begin to see why the management and measurement of HC is of paramount importance and why HC is becoming a key strategic issue within organisations (Boudreau and Ramstad 2007, Thomas et al 2013, Ployhart et al 2014). Furthermore, there is a large and growing body of evidence that demonstrates a positive linkage between the development of HC and performance at both the individual and organisational levels (Becker 1993, Hitt et al 2001, Hatch and Dyer 2004, Kor and Mahoney 2005, Crook et al 2011, Crocker and Eckardt 2014). It can be argued that recruiting and retaining the best employees becomes a key goal of HC management. However, talent management is only part of the equation. The organisation also has to leverage the skills and capabilities of employees by encouraging individual and organisational learning as well as providing a supportive environment where knowledge can be created, shared and applied. The next section in the report will define the concept of HC, which is a key element of IC.

Definitions of human capital

The term human capital can trace its roots to the early 1960s, when Schultz (1961, p140) proposed that HC consisted of the *'knowledge, skills and abilities of the people employed in an organisation'*. While concise, Shultz's initial definition of HC is somewhat limited in that it does not take into consideration the concept of 'value' and the importance of 'investment' in HC. In 1981, Schultz revamped this definition and defined HC as: *'...all human abilities to be either innate or acquired. Attributes ... which are valuable and can be augmented by appropriate investment will be human capital'* (Schultz 1981, p21).

More than a decade later, Becker (1993, p3) defined HC as the *'knowledge, information, ideas, skills, and health of individuals'*. Becker's definition, like Schultz's original classification, is somewhat limited. However, Becker's definition is interesting as it adds an extra dimension in terms of the 'health of individuals'. Indeed, the health and well-being of individuals is an important factor in contemporary research which relates to the contextual development of HC within organisations. Bontis et al (1999, p391) defines HC as *'the human factor in the organisation; the combined intelligence, skills and expertise that gives the organisation its distinctive character. The human elements of the organisation are those that are capable of learning, changing, innovating and providing the creative thrust which if properly motivated can ensure the long-term survival of the organisation'*. Bontis et al highlight the importance of innovation, change and creativity and its role in HC. Moreover, the definition emphasises the role of motivation in leveraging these capacities. The definition acknowledges the importance of 'distinctive character'. Finally, it alludes to the outcome of business sustainability, referring to the 'long-term survival of the organisation'.

More recent definitions of HC include that of Thomas et al (2013, p3), who define HC as the *'people, their performance and their potential in the organisation'*. The inclusion of the term 'potential' is important as it indicates that employees can develop their skill and abilities over time. This definition is in line with the definition of Dess and Picken (1999, p8), who suggest that HC consists of *'the individual's capabilities, knowledge, skills and experience of the company's employees and managers, as they are relevant to the task at hand, as well as the capacity to add to this reservoir of knowledge, skills, and experience through individual learning'*. Dess and Picken's definition of HC is much more expansive than others and crucially highlights that individuals can 'add' to their knowledge base through learning.

Other definitions of HC have emphasised different outcomes of HC. For example, Frank and Bernanke (2007) and Acemoglu and Autor (2009) emphasise the role of HC on worker productivity in their respective definitions, while authors such as Davenport (1999) acknowledge the role of HC on job performance. Another important definition is that of Ployhart et al (2014), who define HC in the context of organisational/unit-level outcomes. Ployhart et al refer to this type of HC as HC resources.

Emerging tensions within the human capital literature

The definitions of HC referred to so far have largely focused on the individual level of HC, that is, the knowledge, skills and abilities of individuals. These definitions make reference to the antecedents of HC, such as employee motivation, development and well-being. However, the outcomes of HC largely refer to job performance and productivity, rather than the firm-level outcomes of best practice or competitive advantage (Ployhart et al 2014). In response to growing tensions in the strategy literature, there has been a call for a more focus on the organisational outcomes of HC. This is aligned to the observation that there is a growing consensus in both academia and industry that HC has a key role to play in strategic outcomes. Moreover, the idea of HC emergence is now taking centre stage, that is, how individual-level knowledge, skills and abilities impact unit-level capabilities and outcomes. Until recently, this perspective has largely been neglected in the HC debate (Wright and McMahan 2011, Nyberg et al 2014, Ployhart et al 2014). However, an emerging stream of literature has attempted to unify both the individual and organisation level perspectives of HC and examine how they relate to competitive outcomes (Ployhart and Moliterno 2011,

Coff and Kryscynski 2011, Crocker and Edkardt 2014, Nyberg et al 2014, Ployhart et al 2014).

Within this stream of literature, Ployhart et al (2014) distinguish between HC resources and strategic HC resources, both of which relate to firm-level outcomes (see Appendix 1). A key distinction between HC resources and strategic HC resources relates to the outcome of the resource, that is, best practices (performance parity) versus differentiation (competitive advantage).

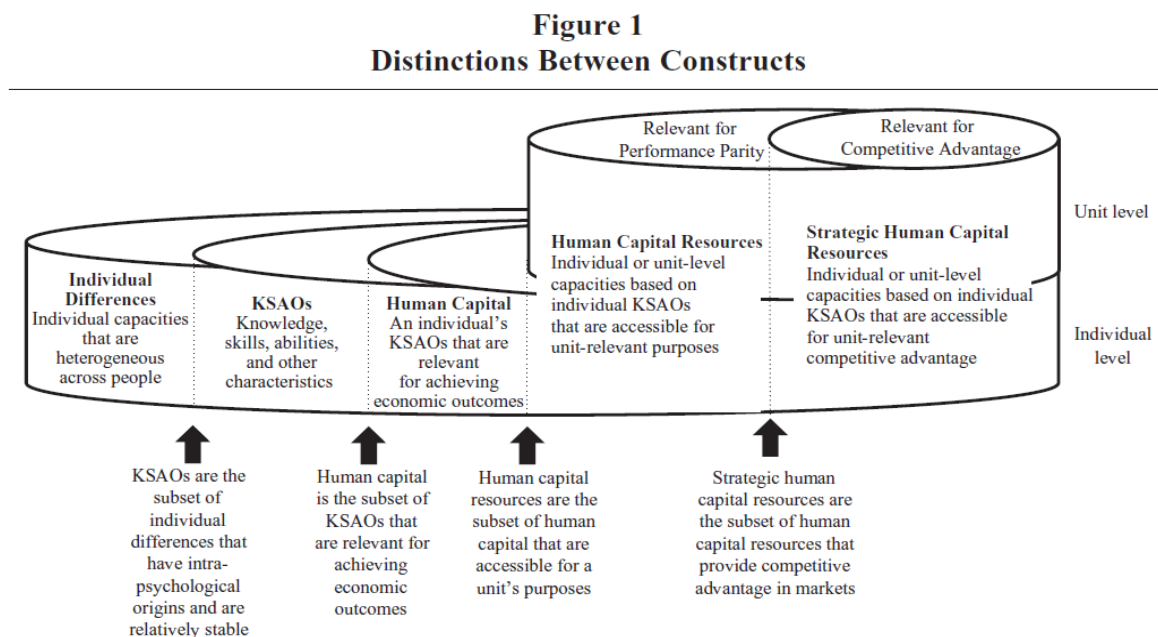
Defining human capital resources

According to Ployhart et al (2014, p381), *'a human capital resource can be defined as individual or unit-level (collective) capacities based on individual KSAOs that are accessible for unit-relevant purposes, that is, best practices'*. In this context, a HC resource is associated with economic parity or best practice outcomes. An example of an HC resource at the individual level which facilitates unit-level outcomes may be an employee who can perform a specific function that is vital to the performance of a specific department, that is, an employee who can speak a foreign language or an IT technician who manages a specific aspect of the firm's IT systems. An example of a HC resource at the unit level which contributes to best practices may relate to the impact of workforce engagement on the business outcomes of customer satisfaction, productivity, employee turnover and accidents (Harter et al 2002).

A strategic HC resource, on the other hand, can be defined, according to Ployhart et al (2014, p381), as *'individual or unit-level (collective) capacities based on individual KSAOs that contribute towards competitive advantage'*. An example of a strategic HC resource at the individual level may refer to the contribution of 'stars' to competitive advantage. Stars are defined as individuals who contribute disproportionately to unit outcomes, that is, a renowned scientist with many patents (see for example, Groysberg and Lee 2009, Hess and Rothaermel 2011). Finally, an example of strategic HC resources at the unit level may refer to the impact of *unit-level* HC initiatives such as the influence of top management teams on innovation and competitive advantage (Flood et al 1997), or the impact of a culturally diverse workforce on competitive advantage (Richard 2000).

Ployhart's definition (and dissection) of HC resources is a necessary step towards construct clarity because it establishes a common language that integrates earlier work on the subject. Prior to the introduction of such frameworks, there was a considerable amount of confusion and tension within the strategy literature surrounding HC at different levels with organisations. This led to a plethora of misconceptions surrounding the micro-foundations of HC (Barney and Felin 2013). Consequently, this meant that studying and measuring HC at the organisation level was initially quite challenging (Nyberg et al 2014, Ployhart et al 2014). Hence, Ployhart's framework represents a contemporary strategic tool for HC management and measurement theory, as shown in Figure 1. See Appendix 1 for an additional example.

Figure 1: A distinction between human capital and human capital resources (adapted



More recently, there has been growing tensions with the multi-level HC literature. For example, recent research has started to examine the idea of *emergence* (see Ployhart et al's 2014 framework) and linked the impact of individual-level KSAOs and other characteristics to unit-level performance (Ployhart and Moliterno 2011, Ployhart et al 2014). Conversely, as critics such as Crocker and Eckardt (2014) argue, the literature has, up until recently, neglected the reverse relationship, that is, how unit-level outcomes may facilitate individual performance (Crocker and Eckardt 2014, Eldor and Harpaz 2016, Aryee et al 2016.). For example, Eldor and Harpaz (2016) examined how a learning climate can facilitate employee engagement and extra role behaviours, and Aryee et al (2016) applied Vroom's motivational framework at the unit level to examine how collective HC (ability) and aggregated service orientation (motivation) impact individual-level service quality.

Definitions of social and structural capital

Social capital defined

Social capital is a term traditionally associated with the field of social science (Bourdieu 1986, Coleman 1988, Putnam 1995). However, social capital is also commonly linked with the knowledge management field (Liu 2014, Wu and Lee 2016), in particular, the study of intangible assets and IC (Edvinsson and Malone 1997, Nahapiet and Ghoshal 1998, Grigoriou and Rothaermel 2014). Consequently, social capital is often mistakenly confused with HC, as both concepts focus on the human aspects of the organisation. However, where HC provides organisations with a platform for diverse ideas and thoughts, social capital helps individuals to connect ideas and knowledge in unforeseen and unusual combinations which facilitate radical breakthroughs. In other words, social capital refers specifically to the capital embedded within network structures and ties rather than the capital present with individuals, HC. Both concepts can be fundamentally different, yet they may also complement each other in unique ways to create organisational value.

According to Bourdieu (1986), social capital can be defined as '*the relational networks in actual and potential capital based on individual or social units*'. Tseng et al (2014) highlight that network members effectively develop social capital through connections and mutual trust. Trust is an important element of social capital. For example, in order for people to co-operate to achieve their goals, they need not only to know one another, but also to trust each other so that they will not exploit or cheat in their relationship, and can expect truly to benefit from their co-operation (Field et al 2003). Coleman (1990) also emphasises the role of trust and suggests that social capital is '*a human asset, categorised as trust, social structure, and effective sanction*'. The term 'effective sanction' refers to penalties for deviating from obligations and norms. At the organisational level, social capital is defined as the '*organisational value in relationships members form to engage in collective action*' (Nahapiet and Ghoshal 1998, p243).

Social capital also represents a key component of IC that enables the development of both human and organisational capital through the sharing of ideas and knowledge, facilitated by network structures, ties and relationships (Edvinsson and Malone 1997, Nahapiet and Ghoshal 1998, Tseng et al 2014, Mayo 2016). Not only does social capital enable the development of HC by augmenting existing knowledge with new knowledge embedded within internal relationships (Coleman 1988), it also facilitates the development of structural capital by converting the tacit knowledge of individuals into explicit knowledge to be shared throughout the organisation (Kogut and Zander 1992, Nonaka and Takeuchi 1995). This enables the development of organisational capital such as routines and processes, which are inherently difficult to emulate outside the focal organisation (Nonaka and Takeuchi 1995, Edvinsson and Malone 1997, Nahapiet and Ghoshal 1998, Felício et al 2014, Grigoriou and Rothaermel 2014, Tseng et al 2014, Wei-Lei and Yi-Chih 2016a). Furthermore, it can often constitute a source of innovation and competitive advantage, for example, patents (Lepak and Snell 1999, Subramaniam and Youndt 2005, Cabello-Medina et al 2011).

As social capital facilitates the development of HC by combining existing knowledge with new knowledge, both concepts are closely linked to the HC literature (see Pennings et al 1998, Liu 2014, Grigoriou and Rothaermel 2014, Han et al 2014 for examples). For instance, Hollenbeck and Jamieson (2015) argue that the analysis of social networks can be a key source of HC knowledge for management, and they highlight that social network analysis can prevent employee turnover as managers are able to identify high-performing employees who struggle to make social ties and are isolated within the organisation. Alternatively, some social capital theories, such as social exchange theory, can actually oppose HC in certain conditions (Koster et al 2011). On the whole, social capital is viewed as fundamental to the development of both human and structural capital because it facilitates the sharing of ideas that results in structural capital outputs such as databases and patents, which in turn contribute to the creation of knowledge capital and firm-level advantage (Nonaka and Takeuchi 1995).

Structural capital defined

According to Ordonez de Pablos et al (2013, p125), '*Structural capital can be described as the supportive infrastructure, processes, and databases of the organisation that enable human and social capital to function*.' More specifically, structural capital comprises intangible organisational assets such as organisational processes, patents and trademarks. In addition, structural capital may refer to the organisation's image, climate, internal

structures, information systems and proprietary databases. In other words, it is the knowledge assets that are left behind when humans leave work each day.

Because of growing tensions within the IC literature and calls for greater construct clarity, it is often recommended that structural capital be subdivided into the following categories (Edvinsson and Malone 1997):

- **Organisational capital** – refers to the organisation’s philosophy and systems for leveraging the organisation’s capability. This can refer to the firm’s databases and information technology structures that support human and social capital in the creation of new knowledge. Organisational capital can also refer to the firm’s internal climate and structures. For example, a more inclusive (equal) and diverse climate will allow HC to function at optimal levels (Armstrong et al 2010).
- **Process capital** – includes the techniques, procedures and programmes that implement and enhance the delivery of goods and services (Edvinsson and Malone 1997). It is the collective knowledge, routines and procedures embedded within the organisation. The principal role of process capital is to link the resources of the organisation together into a system that creates value for customers and sustainable competitive advantage for the firm (Dess and Picken 1999, p11). This could refer to lean management processes that emphasise a reduction of waste, organisational efficiency and improved value for customers (Womack and Jones 1994, 1996).
- **Innovation capital** – relates to intellectual property and certain other intangible assets. Intellectual property may include protected commercial rights such as patents, copyrights and trademarks (Chen et al 2004). Innovation capital is not only important for new product introductions; it also constitutes an important capability which can be leveraged in times of change when firms have to reinvent or reorient themselves in the face of changing industry conditions.

Structural capital has an important interdependent relationship with human and social capital. For example, it is the knowledge residing within individuals (HC) that contributes to a firm’s innovation capital, such as patents – innovation capital. On the other hand, an employee may interact with a firm’s existing patents and databases to create new knowledge (Mahoney and Kor 2015, Molloy and Barney 2015). For example, Mahoney and Kor 2015 use the example of a scientist who interacts with the firm’s intellectual assets (for example patents and tacit knowledge) to create and share new knowledge (Nonaka and Takeuchi 1995). Hence, the co-specialisation of human, social and structural assets becomes a critical issue in the development of IC.

Definitions of intellectual capital

According to Edvinsson and Malone (1997), human, social and structural capital combine to form what is known as an organisation’s IC. IC, or knowledge capital as it is sometimes called, is defined by Edvinsson (1997, p368) as *‘the possession of knowledge, applied experience, organisational technology, customer relationships, and professional skills that provides organisations with a competitive edge in the market’*. Sydler et al (2014) argue that there can be a number of different interpretations of the term IC. For example, Klein and Prusak (1994) adopt a retrospective view of IC and define IC as *‘intellectual material that has been formalised, captured, and leveraged to produce higher valued assets’*. On the other hand, Lev (2001) generates a prospective view of IC. Lev (2001, p5) interprets intangible

assets as *'claims to future benefits, which have neither a physical nor financial form'*, for example, knowledge flows created through R&D (Sydler et al 2014). Finally, Rastogi (2003, p232) defines IC from a capability standpoint and argues that *'intellectual capital may properly be viewed as the holistic or meta-level capability of an enterprise used to coordinate, orchestrate, and deploy its knowledge resources'*. Taken together, IC refers to the ability of the organisation to leverage the knowledge resources embedded within the firm's *human, social and structural* capital in order to give the firm a knowledge advantage.

Tensions between human, social and structural capital

Because of the introduction of unifying concepts such as IC or knowledge capital, human, social and structural capital are often seen as having a complementary relationship with each other. However, while the various forms of capital do indeed interact with each other, the concepts do not always align neatly with each other in the pursuit of organisational outcomes (Subramaniam and Youndt 2005). For example, Subramaniam and Youndt (2005) have found that while human and social capital combine to positively impact a firm's radical innovation capabilities, organisational capital was found to influence only a firm's incremental innovation capabilities. This may be due to the observation that organisational capabilities often refer to routines and procedures that facilitate continuous improvements rather than radical explorative change.

Both tensions and complementarities can exist between various forms of knowledge capital. Hence, it is vitally important that management are able to measure the various interactions between human, social and structural capital in the pursuit of organisational outcomes. In light of the above analysis, it can be argued that it is the unique combinations and co-specialisation of human, social and organisational assets that create knowledge (intellectual) capital and the potential for competitive advantage.

Finally, from a theoretical standpoint, there can also be instances where HC and social capital are contradictory. Traditional HC theory suggests that firms should not invest in the general skills of the workforce as this will lead to increased employee turnover because of the transferability of the skills in other organisations (Becker 1964). On the other hand, social exchange theory suggests that employees may perceive investment in general skills as an investment in their development and thus may reciprocate by staying with the incumbent firm (Koster et al 2011). Once again the stance the organisation takes is very much dependent on the type of strategy the firm adheres to and the HC goals the organisation aims to meet.

Summary

The above sections highlight the important role HC plays in the creation of knowledge capital. Not only does HC combine with social capital to create new knowledge, HC can also interact with structural capital. However, it has also been highlighted that while human, social and structural capital combine to form IC, there can be strategic differences in how the various forms of capital are deployed. In this sense, it is imperative that management can measure the various interactions between the different capitals. As this report focuses on the human aspect of IC in terms of management and measurement theory, the review also acknowledges the relationship between HC and social capital and structural capital in the following sections.

1 Human capital at the individual level

This section focuses on HC at the individual level, commonly referred to as the micro-foundational level within the HC literature. Although the main focus will be on the employee and job performance, the commentary also shows how an individual's knowledge, skills, abilities and other characteristics (KSAOs) can contribute to organisational-level capabilities. This in turn will help link this section (the micro-foundational level) with section 2 (the organisational level). Moreover, the reverse relationship will also be discussed, that is, how collective/organisational-level practices influence micro-level HC (Aryee et al 2016, Eldor and Harpaz 2016). The importance of measurement is discussed throughout the section owing to the observation that the measurement of individual-level HC initiatives can facilitate the development of organisational-level capabilities.

First, HC theory is discussed and the main principles underlying HC theory are outlined. Following this, the tensions within HC, that is, competing/complementary theories of HC, are outlined. We then review the antecedents of HC at the individual level, which include employee training, opportunities for learning, employee development and career management, non-cognitive skills, employee motivation and engagement, and talent management and succession. Finally, employee and social issues, for example employee diversity, equality, and health and safety, are discussed.

Origins of human capital theory

The theory of HC can trace its origins to macroeconomic development theory. In the 1950s, the main factors of production comprised land, labour, physical capital and management (Mincer 1962b, Becker 1993). By the 1960s, however, economists had great difficulty in explaining the growth of the US economy based on the aforementioned factors of production (Schultz 1961). It was the empirical work of Becker (1964), Schultz (1961) and Mincer (1974) that challenged the prevailing assumption that the growth of physical capital is paramount to economic success. The basic premise behind HC theory is that people's learning capacities are of comparable value with other resources involved in the production of goods and services (Lucas 1990).

Applied in the context of organisations, HC theory suggests that individuals who invest in education and training will increase their skill level and be more productive than those less skilled, and so can justify higher earnings as a result of their investment in HC. As Becker (1993, p19) suggests, '*schooling raises earnings and productivity mainly by providing knowledge, skills and a way of analysing problems*'. Moreover, Becker's ideas play an important role in contemporary employee development and learning literature, as HC theory fuels the idea that employees' knowledge and skills can be developed through investment in education or training, that is, learning (Grant 1996a, Hatch and Dyer 2004).

One of Becker's most important contributions to employee development theory relates to training. Becker (1964) argues that, on the whole, investments in education and training will improve productivity; however, it is the *type* of training that determines *who will pay for* the training, that is, the employee or the firm. Earlier work by Pigou (1912) came to the conclusion that firms would not have sufficient incentives to invest in their workers' skills because trained workers can quit to work for other employers who can use these skills.

However, Becker (1964) challenged this assumption and argued that organisations would be more willing to *share the costs* of firm-specific training as it is valuable to the incumbent firm only. This is due to the observation that employees and potential employers would not benefit from the same level of productivity if they changed jobs.

Becker argued that firms will be less willing to pay for general skills primarily because, in a competitive labour market, where workers receive their marginal product, firms could never recoup their investments in general skills, so they will never pay for general training. Moreover, as the skills are classed as 'generic' in nature, an employee could easily switch to another employer as their skills are not firm-specific. Thus, the firm would lose its initial investment. Instead, Becker argued that employees themselves would have the right incentives to improve their general skills because, in competitive markets, they are the sole beneficiaries of the improvements in their productivity (Acemoglu and Pischke 1999). Moreover, workers can undertake such investments quite easily by accepting a lower wage than their productivity during the period of training (Becker 1964). The logic behind this observation relates to the idea that employees will view paying for general training as an investment, which they anticipate will lead to higher future wages, regardless of the firm they are working with.

Limitations of Becker's research

Despite the significant contribution of Becker's work to contemporary academic thinking on the management of people, Becker's work has also been the subject of a number of practical and theoretical criticisms over the years. First, Oliveira, and Da Costa (2014) note that Becker's initial research on education and earnings ignores the role of worker experience. Oliveira and Da Costa (2014) highlight that Becker declined to measure experience, despite its importance for employers, who rank it both highly in selection and employment. Second, as highlighted by Morgan and Winship (2015), the concept of ability in Becker's research is a contentious issue. Although Becker adjusted for IQ and individuals' performance in high school (that is, high school rank) in his analysis, many theorists still contend that the purported causal effect of education on earnings may instead reflect 'ability' rather than any productivity-enhancing skills gained through educational institutions.

Oliveira and Holland (2007) and Oliveira and Da Costa (2014) also argue that Becker disregards any education or training that is neither formally structured nor requires financial investment. In other words, Becker places too much emphasis on investments in formal training (that is, general and specific), and neglects the role of informal training/informal learning. Informal learning is essentially learning by doing, or learning from experience. For example, employees can learn a lot by just casually experimenting on the job. Barron et al (2007) have highlighted that informal learning is especially prevalent at the beginning of a worker's employment.

Acemoglu and Pischke (1999) emphasise that while Becker subdivides skills into general or specific, many skills tend to be industry-specific. For example, knowing how to use a printing machine is of limited use outside the printing industry. Nevertheless, under Becker's framework, these skills are 'general' because typically there are many firms in the same industry using similar technologies. Estevez-Abe et al (2001) build on Becker's framework and make a distinction between general, industry- and firm-specific skills. The authors argue that industry-specific training can be defined as training which boosts the productivity of all

other firms in the industry, but not outside the industry. Examples include skills acquired through apprenticeships and at vocational schools.

Finally, Becker's theory largely ignores the role of non-cognitive abilities. In recent years there has been a growing focus on non-cognitive skills and abilities (Heckman and Rubinstein 2001, West et al 2016). In contrast to cognitive skills, non-cognitive skills are not directly related to the process of acquiring knowledge through the senses, experience or reasoning. Instead, non-cognitive skills consist of the behaviours, mindsets, attitudes, learning strategies and social skills that can have a profound effect on the way human beings learn. For example, an employee may be cognitively strong, but if they do not have the resolve to attend training sessions within the organisation, they will never reach their full potential. In this sense, factors such as self-efficacy, grit, motivation, self-control, resilience, optimism, hope and the ability to work with others become important to the success of employees in organisations (Heckman and Rubinstein 2001, Luthans et al 2007, 2008, Avey et al 2010a, West et al 2016). Furthermore, the measurement of non-cognitive abilities is also becoming a key issue within organisations (Avey et al 2010b).

From a theoretical standpoint, Becker's theory has also been the subject of debate. For example, Spence (1973) offers a theoretical response to HC theory and the findings of Becker's research in the form of signalling theory. While Becker argues that investment in education and training will improve productivity and earnings, Spence (1973) takes a different view and argues that because of the unobserved ability of workers (information asymmetry), education merely serves as a signal to employers regarding the quality of workers, that is, an MBA or a degree from a prestigious university or college. According to Connelly et al (2011, p43), *'Spence's model stands in contrast to human capital theory because he de-emphasizes the role of education for increasing worker productivity and focuses instead on education as a means to communicate otherwise unobservable characteristics of the job candidate (Weiss, 1995).'*

According to Hämäläinen and Uusitalo (2008), this controversy is difficult to resolve because in most cases both theories have identical predictions. For instance, both predict that earnings rise with education. However, the policy conclusions are very different. According to the HC theory, increases in educational levels has important effects on productivity and economic growth. Conversely, signalling theory posits that education has no effects on productivity and, even though investments in education may be profitable for the individuals pursuing education, they are, in general, not beneficial for society as a whole (Hämäläinen and Uusitalo 2008). In this sense, signalling theory is offered as a theoretical response to the findings of Becker. Moreover, there have been a number of articles which find support for signalling theory. For example, Hämäläinen and Uusitalo (2008) find support for signalling theory in their study on Finnish polytechnic school reform.

Finally, some researchers take an alternative perspective on the outcomes of HC theory. For example, Schultz (1961) and Nelson and Phelps (1966) view HC as the capacity to adapt in changing environments. Both Schultz and Nelson and Phelps argue that HC is especially useful in dealing with 'disequilibrium' situations, or more generally, with situations in which there is a changing environment, and workers have to adapt to this. For example, Schultz and Nelson and Phelps propose that the HC of the workforce is a crucial factor facilitating the adoption of new and more productive technologies. Furthermore, in an era of sustainability, firms are increasingly turning to their employees as a source of innovation and

challenging them to find new ideas and routines to operate more sustainably. Hence, a firm's HC can be pivotal in firm adaptation in uncertain or changing environments. Schultz's and Nelson and Phelps's ideas on HC have a major role to play in contemporary HC theory, both at the individual and unit level, for example dynamic capability theory (see section 2). It is also important to remember that individual-level change initiatives such as employee empowerment and flexibility play a key role in overall organisational change. On this note, the next section discusses the antecedents of HC at the individual level. The following sections also demonstrate that individual-level constructs can link to unit-level resources.

Contemporary human capital management theory: micro-foundations of human capital

This section reviews the contemporary literature at the micro-foundational level of HC. First, we discuss the role of employee training, opportunities for learning and career management in the development of HC. Following on from this, we discuss the contextual factors surrounding HC, that is, positive psychological capital and employee engagement. The final section discusses strategies for attracting, deploying and retaining talent.

Employee training

Researchers have long understood that HC, especially one's education and training, plays a key role in both employee and firm performance (Becker 1993, Schultz 1961, Mincer 1974). As highlighted in the previous section, Becker's (1964) research was a milestone for employee development theory. Much of the contemporary literature on training and development finds a positive relationship with both individual performance (Schmidt 2007, Jones et al 2012, Bapna et al 2013) and firm-level performance (Hatch and Dyer 2004, Vidal-Salazar et al 2012, Georgiadis and Pitelis 2016).

More specifically, at the employee level, studies have examined the impact of training on employee earnings (Regner 2002, Jones et al 2012), employee productivity (Huselid 1995, Jones et al 2012), employee job performance (Bapna et al 2013), employee turnover (Benson et al 2004, Koster et al 2011), job satisfaction (Schmidt 2007), employee attitudes (Sahinidis and Bouris 2008, Truitt 2011), employee empowerment (Jun et al 2006), teamwork (Jun et al 2006) and commitment (Vidal-Salazar et al 2012).

The above list of research studies is not exhaustive; it serves mainly as a guide to highlight the plethora of studies examining the relationship between training and development and individual-level outcomes. For the vast majority of studies shown above, HC investments in training generally improved the listed outcomes. Thus, there is strong empirical support in the literature which indicates that employee training (both general and specific) enhances individual-level outcomes as suggested by Becker (1964). In terms of Becker's theory on general and firm-specific training, research has demonstrated mixed results. For instance, Becker suggested that firms should not pay for general training as this would lead to mobility. Indeed, Benson et al (2004) found that when employees earned their graduate degrees (general skills), as opposed to bachelor degrees, they were more likely to leave the organisation. On the other hand, Koster et al (2011) and Fallon and Rice (2015) found that investment in general skills was perceived by employees as a positive investment in employee development and had no effect on turnover.

Moreover, there are many studies that find that investment in general training can have real value for the organisation and, in some cases, can have a greater impact on employee

outcomes (such as earnings, job performance) than firm-specific training in certain industries and contexts. For example, in the Indian information technology sector, Bapna et al (2013) highlight that general training has a greater impact on employee performance, as opposed to firm-specific training. More specifically, the authors highlight that participation in one additional general training course results in a 2.14% increase in performance for an average employee.

Employee training is also shown to facilitate employee knowledge and skills (KSAOs) through learning and development (Hatch and Dyer 2004, Vidal-Salazar et al 2012). For example, Vidal-Salazar et al (2012) note that employee training is an important generator of employee capabilities. More specifically, the study found that employee training has a positive relationship on both employee knowledge and workforce commitment. Hatch and Dyer (2004) also argue that employee training facilitates learning and enhances problem-solving skills (a key cognitive ability), while Cohen and Levinthal (1990) claim that training helps boost a workforce's absorptive capacity, that is, the ability to identify, assimilate, transform and apply valuable external knowledge. The construct is particularly pertinent to the firm-level outcomes of employee training.

Opportunities for learning

Training is just one aspect of how employees learn. Armstrong (2014) and Machado and Davim (2014) have highlighted that employees have a number of avenues for attaining new knowledge, including workplace learning, self-directed learning, e-learning and mentoring.

Workplace learning

Workplace learning is largely experiential in nature. A study by Eraut et al (1998) has highlighted that education and training only explains a small portion of what employees learn at work. Moreover, Eraut et al found that non-formal learning, which is neither specified nor planned, has a major role to play in employee learning. Experiential learning can also help facilitate what is known as double-loop learning. Double-loop learning entails the modification of goals or decision-making rules in the light of experience. The first loop uses the goals or decision-making rules, the second loop enables their modification, hence 'double loop'. Double-loop learning recognises that the way a problem is defined and solved can be a source of the problem (Argyris 1991). Socialisation on the job and interaction with colleagues can help facilitate workplace learning. Encouraging employees to create content based on their successes and failures is key. Hence, it is important that employers create an environment that facilitates knowledge-sharing.

Self-directed learning

Self-directed learning is largely self-paced. Individuals review what they have learned, what they have achieved, what their goals are, how they are going to achieve those goals and what new learning they need to acquire (Armstrong 2014). In other words, employees are afforded autonomy and are allowed to follow their own development path. According to Armstrong (2014), self-directed learning is based on the principle that people learn and retain more if they find things out for themselves; however, they still need to be given guidance on what to look for and where to find it. Self-directed learning is becoming increasingly vital in rapidly changing industries. For example, a software developer must continuously be on the lookout for new coding developments, learn these and apply them in developing new products (Smither and London 2009). In these industries, self-directed

learning may lead to improved employee and firm performance (Powell 1995, Boyer et al 2014).

Research on self-directed learning is sparse, particularly in relation to employee- and firm-level outcomes. However, one of the main antecedents of self-directed learning is employee empowerment, that is, affording employees the responsibility of making key decisions and commitments. Employee empowerment has been linked to both employee outcomes, that is, satisfaction and commitment (Argyris 1991, Eylon and Bamberger 2000), and firm-level outcomes, that is, improved operational capabilities and product quality as a result of employee improvement suggestions and the involvement of employees in the product design process (Powell 1995).

Mentoring

According to Klinge (2015, p1), mentoring is '*traditionally a process in which an experienced person (the mentor) guides another person (the mentee or protégé) in the development of her or his own ideas, learning, and personal/professional competence*'. The role of a mentor is to provide advice and also help the mentee reflect on their experiences in order to further their development. The mentor's own experience is of particular value to the mentee. Moreover, mentors are particularly astute at facilitating double-loop learning as they can encourage the mentee to reflect on current learning and how future learning may be improved (Argyris 2004, Klinge 2015). Mentoring also brings a wide variety of benefits to both the protégé and the organisation (see Appendix 2). Klinge (2015) has highlighted that a potentially overlooked aspect of mentoring concerns mentors serving as role models and supporters for under-represented minorities. For example, pairing a new, lesbian, gay, bisexual or transgender (LGBT) employee with a successful LGBT mentor could foster improved employee performance (Gedro 2006, Klinge 2015). Mentoring also promotes on-the-job learning and can act as a complement to formal training (Armstrong 2014).

Electronic learning (e-learning)

E-learning involves the use of computer, networked and web-based technology to provide learning material and guidance to employees (Armstrong 2014). E-learning often acts as a supplement to face-to-face learning. Stephan et al (2016) highlight that many firms are turning to web-based learning platforms. For example, Dupont recently embarked on a major project to replace, simplify and combine all of its HR and learning systems into one integrated portal. Web-based learning portals have been commonplace in many universities for over a decade; however, they are now being implemented in many organisations. Dupont also deliver learning courses via apps; these courses are also available on iTunes (Stephan et al 2016). As Armstrong (2014) notes, however, e-learning programmes are not as effective for developing soft skills, such as team-building.

Employee development and career management

The previous sections discussed employee training and opportunities for learning, both of which are key pillars of employee development. This section first discusses the importance of employee development within organisations. It then highlights the importance of linking development plans with employee career objectives in order to align organisational goals with employee goals.

Employee development

According to Nadler (1979, p88), '*employee development is concerned with preparing employees so that they can move within the organisation as it develops, changes and grows*'. The continued development of employees is important. An organisation which does not develop its workforce cannot develop its competitive strategies. For example, a study by Mason and Bishop (2015) examined the impact of the UK recession on adult training. The study found that employers reduced off-the-job training during the recession. However, the effects of such cutbacks on skill levels were partially alleviated by more precise targeting of on-the-job training to meet skills improvement needs. Nevertheless, the authors argue that future productivity and competitiveness are likely to be impaired by failure to upgrade adult workers' skills during the recession (Mason and Bishop 2015, Kim and Ployhart 2014). Hence it is possible that skill gaps will develop within organisations as a result of fragmented development programmes during this period (Mason and Bishop 2015).

Not only is employee development important from an organisational perspective; it is also important from an employee standpoint (Armstrong 2014). There is also a stream of research which suggests that employees will behave favourably within firms when they perceive the organisation as having their best interests at heart, that is, focused training, career development plans and new learning opportunities. For example, in a study by Fallon and Rice (2015), the researchers compared the role of perceived employee development (PED) in paid and volunteer staff turnover intentions. It was found that personal development was a strong predictor of job satisfaction for paid employees and, in turn, job satisfaction was a stronger predictor of an intention to stay for paid employees (indirect relationship). In terms of voluntary workers, support and recognition was a stronger predictor of job satisfaction for volunteers. The findings of the study also advocated the idea of tailored employee development programmes to enhance employee satisfaction.

Moreover, Hosie et al (2013) have found that in the south-east Asian retail petroleum industry, worker autonomy (empowerment) and training opportunities are strongly related to job satisfaction. The results showed that these two variables alone accounted for 35% of the variance in job satisfaction, while skill variety and task feedback accounted for 15%. Moreover, the role of feedback in employee development should not be underestimated. For instance, Kuvaas and Dysvik (2010) have found that the relationship between the perceived helpfulness of performance appraisals (positive employee reactions) on work performance was significant only for employees reporting high levels of perceived regular day-to-day feedback. The results also showed that the perceived helpfulness of employee appraisals was directly related to affective employee commitment. As evidenced from the above sections, a one-size-fits-all approach to employee development is now obsolete. Development plans must be tailored to individual goals as well as the organisations, and feedback must be both accurate and relevant to the employee (Kuvaas and Dysvik 2010).

The measurement of employee development is also a critical issue. It has already been highlighted how employee development is linked to a wide range of employee outcomes, such as employee performance (Bapna et al 2013), job satisfaction (Hosie et al 2013, Fallon and Rice 2015), employee turnover (Benson et al 2004, Koster et al 2011), extra-role discretionary behaviours (Gavino et al 2012) and employee attitudes (Sahinidis and Bouris 2008). Employers must also be able to manage and measure employee development in order to avoid the threat of skill gaps or obsolete skills (Bapna et al 2013, Cabrilo et al 2014, Mason and Bishop 2015). Hence by measuring employee development, employers can

make more informed decisions regarding the effective deployment of talent and avoid skill shortages or employee turnover. Measuring employee development may involve recording the number of annual promotions within the organisation, analysing the effect of training and feedback on employee outcomes, the type of training courses taken (Del Valle et al 2009), and measuring employee performance and identifying skills gaps (Cabrilo et al 2014).

Career management

Employers must ensure employees have a career path in the organisation. Gaffney (2005) emphasises that it is not enough to have employee development plans in place; career plans must be put in place and aligned with employee goals in order to reduce employee turnover and to increase employee engagement (Byrne 2015). A career development path provides employees with an ongoing mechanism to enhance their skills and knowledge, which leads to mastering their jobs and added professional development. For example, in a study by Benson et al (2004), the researchers examined the impact of general skill development and voluntary turnover at a large manufacturer in the US. The results showed that participation in tuition reimbursement reduces turnover while employees are in school. The results also demonstrated that for individuals who enter a firm who are not already college graduates, a tuition reimbursement programme is a particularly effective means to encourage the more ambitious employees to invest the time needed to improve their skills and enhance their career prospects within the organisation. Moreover, for those in the study who obtained associate's or bachelor's degrees, it was shown that tuition reimbursement enhanced retention while they were studying and was not associated with an increase in turnover when they completed their degrees. Conversely, the results showed that employee turnover increases drastically when individuals earn their graduate degrees.

Crucially, however, the study found that the propensity for employees to leave after earning a graduate degree is greatly reduced if employees are subsequently promoted (even after controlling for the wage increase that accompanies promotions). Hence, a job promotion can be a powerful retention tool, but the organisation must align the promotion with employee goals. As Benson et al (2004, p328) highlight, '*Employers should guard against losing valued employees once they attain graduate degrees by attending to the match between their new skills and their jobs, and by managing their expectations and careers.*' In other words, there has to be an outlet for employees' new skills and lessons, and a career development plan for each employee, otherwise it does not seem like progression.

Non-cognitive abilities

A number of authors have highlighted how non-cognitive skills, such as character skills, personality traits, goals, motivations and preferences, are growing in value (Kautz et al 2014). Heckman and Rubinstein (2001) refer to these skills as non-cognitive skills, which tend to be softer in nature when compared with traditional cognitive skills. In other words, they are psychological in nature and related to mindsets and behaviours. Unlike cognitive abilities, which are relatively stable from an early age and peak in the early twenties (that is, IQ), non-cognitive skills develop across a person's lifetime and do not peak until late adulthood (Borghans et al 2008). Examples of non-cognitive attributes include personality traits, attitudes, behaviours, mindsets and socio-emotional skills.

Research has now started to examine the role of personalities, attitudes and mindsets in relation to human and social capital and workplace outcomes. For instance, research by Yang et al (2011) finds that a proactive personality is positively associated with interpersonal

helping and negatively associated with turnover intention, that is, employees are less likely to leave as they are socially embedded within the organisation. This relationship is mediated by the social capital constructs of trust and information exchange. These authors also emphasise the importance of recruiting individuals high on proactivity as they can be key to an internal social network.

There have been a number of studies that have examined the relationship between psychological capital and employee outcomes. For example, in a study of Egyptian employees, Badran and Youssef-Morgan (2015) find that hope, efficacy, resilience and optimism, individually and when integrated into the higher-order multidimensional construct of psychological capital, are positively related to job satisfaction. Moreover, the authors argue that psychological capital is a potential source of competitive advantage. Furthermore, Avey et al (2009) find that positive psychological capital (PsyCap) is a powerful tool for combating workplace stress and employee turnover. Luthans et al (2008) recommend that employees undergo PsyCap short training interventions (which typically last one to three hours, depending on the number of participants) that include activities designed to enhance the components of efficacy, optimism, hope and resilience, as well as overall PsyCap. These may include confidence-building sessions, goal-setting sessions and teaching employees to forecast unfavourable events and find paths around them (Luthans et al 2006, 2008, Avey et al 2009). Finally, Avey et al (2010a) have found preliminary evidence linking positive psychological capital to employee well-being.

In terms of measuring psychological states, research by Barsade and O'Neill (2016) describes how some firms in the US are measuring day-to-day emotions using an app. Employees can simply use smiley faces to indicate their day-to-day mood and mindset. The 'Niko Niko' app helps individual employees and teams log their emotional reactions to various activities so firms can make the connection between their moods and productivity (Barsade and O'Neill 2016) (see Appendix 3). This is one example of how HC measurement is playing a key role in organisational success.

Employee motivation and engagement

This section discusses the importance of motivation and employee engagement, which comprises a number of different motivational and psychological capital constructs.

Employee motivation

According to Elliot and Covington (2001), motivation can also be defined as one's direction to behaviour, or what causes a person to want to repeat behaviour and vice versa. In an organisational context, motivation can be understood as the desire or drive that an individual has to get work done. There are many different theories of motivation, including Maslow's hierarchy of needs theory, Herzberg's hygiene theory, and McGregor's theory X and theory Y:

- **Maslow's theory** – Maslow's need hierarchy theory postulates that individuals are motivated according to a hierarchy of needs, which start from basic needs such as food, water, sleep, safety, and then go on to need for recognition and, finally, the need to actualise one's vision and reach the highest stage of personality. The premise of the theory is that individuals progress from one stage to the other depending on how well the needs at each stage are met. In essence, organisations have to ensure that employees' needs are taken care of at each level so that by the

time the employee reaches the top of the ladder, they are in a position to actualise them.

- **Herzberg's hygiene theory** – argues that factors causing job satisfaction are different from those causing dissatisfaction and the two feelings cannot merely be treated as opposite to one another. Individuals are not content with the lower-order needs at work – hygiene factors; for example, those needs associated with minimum salary levels or safe and pleasant working conditions. Rather, individuals look for the gratification of higher-level psychological needs having to do with achievement, recognition, responsibility, advancement and the nature of the work itself – motivators. The basic premise of the theory is that the presence of hygiene factors is a precondition for performance and is not a determinant of performance. Managers must not only ensure the presence of hygiene factors to avoid dissatisfaction, but must also provide factors intrinsic to the work itself in order for employees to be motivated or satisfied.
- **McGregor's theory X and theory Y** – focuses on organisational mindsets, whereby type X organisations assume that employees do not like work, dislike responsibility and need to be supervised at every step. Employees in these organisations may view work as a burden, and simply work to survive. Employees in type X organisations tend to work on a 'carrot and stick' basis, and performance appraisal is part of the overall mechanisms of control and remuneration. On the other hand, type Y organisations adopt a more positive view of employees, that is, employees take responsibility and are motivated to fulfil the goals they are given. Furthermore, employees seek and accept responsibility and do not need much direction. In other words, people are self-motivated and thrive on responsibility.

These motivation theories helped to develop an understanding of employee motivation and the design of reward systems. Today, organisations typically deploy a combination of intrinsic and extrinsic rewards in order to motivate employees. Intrinsically motivated employees refer to individuals who place more value on outcomes that are sourced from within, rather than from external factors. In general these rewards are largely intangible in nature. Examples include enjoying a sense of challenge, reinforcing one's self-esteem, satisfaction at one's accomplishments, general enjoyment in one's work, satisfaction at realising one's potential and feeling appreciated with the firm. Generally, intrinsically motivated employees are individuals who are motivated by the work itself, either because they find their work meaningful or it aids in their own development and/or is aligned with their own principles or philosophies.

In today's organisations, employee motivation also plays a key role in *job design* (Bersin et al 2016). For example, as Bersin et al (2016) highlight, '*Millennials, that is, Generation Y, now make up more than half the workforce, and they bring high expectations for a rewarding, purposeful work experience, constant learning and development opportunities.*' Hence organisations have to be able to measure the motivations of different generations of the workforce in order to get them to perform at their optimal level. In this regard, employee surveys can be helpful. In terms of Generation Y, it may mean measuring the degree of job flexibility (Goudreau 2013). Firms also need to be able to measure the outcome of motivational initiatives, which may include measuring the impact of flexibility initiatives on turnover, job performance and employee well-being. Furthermore, many millennials are

especially eager to progress in their careers and less willing to wait three to five years for a promotion (Goudreau 2013).

Employee engagement

There have been numerous definitions of employee engagement. Some researchers define employee engagement as the opposite of employee burnout (Maslach et al 1997, Schaufeli et al 2002), while others stress the importance of investing in one's work role (Kahn 1990). For example, Maslach et al (1997) defined engagement as *'a construct composed of three elements, energy, involvement and efficacy'*. The key observation is that each element is the direct opposite of the three burnout dimensions: emotional exhaustion, depersonalisation and lack of efficacy (Byrne 2015).

Others define employee engagement as a motivational state, as does Byrne (2015) in her unifying definition of employee engagement: *a 'moment to moment state of motivation, wherein one is psychologically present (that is, in the moment) and psycho-physiologically aroused, is focused on and is aligned with the goals of the organisation and channels his or her cognitive self to transform work into a meaningful and purposeful accomplishment'*. Moreover, the Engage for Success movement (2015) embraces the idea of well-being and defines engagement as *'a workplace approach resulting in the right conditions for all members of an organisation to give of their best each day, committed to their organisation's goals and values, motivated to contribute to organisational success, with an enhanced sense of their own well-being'*.

Much of the literature that examines the antecedents of employee engagement frequently employs the job demands–resources model. In particular, several researchers from the health/well-being perspective of employee engagement have used the model to explain the relationship between stressors and engagement (Schaufeli and Bakkar 2004, Bakker et al 2005, Rothmann and Joubert 2007, Crawford et al 2010). The job demands–resources perspective assumes that, whereas every occupation may have its own specific risk factors associated with motivation and job stress, these factors can be grouped into the following two general categories:

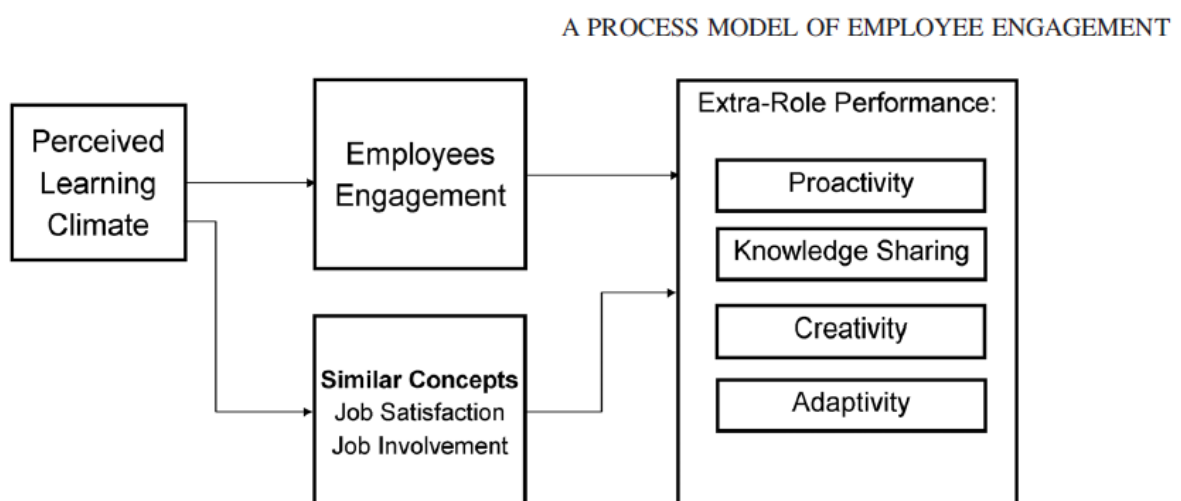
- **Job demands** refer to physical, social or organisational aspects of the job that require sustained physical or mental effort and therefore are associated with certain psychological costs (Byrne 2015). Examples include work pressure (that is, workload), time pressures, emotional demands and difficult physical environments (Demerouti et al 2001).
- **Job resources** refer to those aspects of the job that are functional in achieving work goals, stimulate personal growth and development, and reduce job demands and their associated physiological and psychological costs. Examples include autonomy, strong work relationships, prospects for advancement, performance feedback, task variety, coaching and mentoring, and opportunities for learning and development (Demerouti et al 2001, Demerouti and Bakkar 2006, Crawford et al 2010, Byrne 2015).

Other important models in the realm of employee engagement include the job characteristics model (Hackman and Oldham 1980), which argues that skill variety, task variety, autonomy and feedback lead to experienced meaningfulness, felt responsibility and growth on the job, all of which have corresponding effects on performance outcomes, such as higher quality,

lower turnover, lower absenteeism and improved job satisfaction. Both the job demands model and the job characteristics model underline the importance of presenting opportunities for employees to become more involved in their jobs through providing new opportunities for development, affording greater autonomy and task variety, and allowing employees to craft their experience of work. In this way, employees' goals align with organisational goals (Petrou et al 2016).

There is increasing evidence in the literature to suggest that employee engagement is fundamental to job performance. For example, Saks (2006) finds that perceived organisational support (a unit-level resource) predicts both job and organisation engagement, while job characteristics predict job engagement and procedural justice predicts organisational engagement. Crucially, however, job and organisational engagement were both found to predict job satisfaction, organisational commitment, intentions to quit, and organisational citizenship behaviour. This is important, as research by Podsakoff et al (2009) found that organisational citizenship behaviours (OCBs) were found to be related to a number of organisational-level outcomes (for example, productivity, efficiency, reduced costs, customer satisfaction, and unit-level turnover). Hence the important role of employee engagement is underlined. Furthermore, Eldor and Harpaz (2016) have found that an organisation's learning climate is a predictor of employee engagement, and in turn, employee engagement predicts discretionary or extra-role performance in terms of proactivity, knowledge-sharing, creativity and adaptability (see Figure 2). Moreover, this study highlights three important points. First, firm-level resources, that is, the learning climate, can facilitate individual-level outcomes, that is, engagement. A similar finding is seen in the Saks (2006) research study. Second, employee engagement is not only important for job performance, but also discretionary effort, such as knowledge-sharing, creativity and adaptability. Finally, employee engagement was shown to have a greater impact on extra-role behaviours than competing concepts such as job satisfaction and job involvement.

Figure 2: A process model of employee engagement (adapted from Eldor and Harpaz 2016; supported hypothesis model)



The measurement of employee engagement has become crucial for organisations. However, Brown et al (2016) highlight the importance of measuring employee engagement on a regular basis. This could mean, for example, monitoring employee attendance. For instance, organisations classed as having highly engaged workforces had greater attendance records (Mayo 2016). Other methods of determining employee engagement may involve measuring the number of discretionary courses taken by employees. Byrne (2015) warns, however, that employees can also become too engaged in their work and this can lead to negative psychological states. Workaholism can be a problem in some organisations (Byrne 2015). Hence, firms would need to put in place well-being measures to ensure employees are not overworking, which could involve measuring working hours and ensuring employees do not work during lunch hours (Byrne 2015). Finally, firms need to measure the outcomes of engagement on both job performance and organisational performance. This could involve correlating the number of discretionary training courses taken and the impact this has on job performance and organisational performance variables, such as job satisfaction, productivity, and creativity and innovation.

Employee creativity and innovation

This section considers both creativity and innovation. We show that a considerable amount of innovation is created at the employee level through employee creativity. This section also discusses the concept of emergence, in particular how employee attitudes enable or constrain innovation at the firm level.

Employee creativity

Employee engagement is linked to employee creativity (Eldor and Harpaz 2016). This may be because of the observation that when employees are invested in their work, they are more likely to have a better understanding of their work and therefore opportunities for improvement or experimentation (Eldor and Harpaz 2016). Moreover, engaged employees are more likely to come up with creative ideas as opposed to employees who simply do not care about their work. It also could be the case that employee empowerment, an antecedent of engagement, could be the catalyst for creativity (Sun et al 2012). Hence, employee creativity is influenced by a multitude of individual- and firm-level factors.

According to Amabile (1996) and Shalley and Zhou (2008), '*Creativity refers to the production of new and useful ideas which fuels innovation in products, services, processes, and procedures in organisations.*' Shalley et al (2004) suggest in their theory-building paper that determinates of creativity at the individual level may include employee personality (openness to experience), cognitive style (that is, problem-solvers), job complexity (challenge), relationships with supervisors and colleagues (leadership style), relationship with co-workers (feedback), rewards, employee evaluations (development), the degree of workspace and time deadlines (constraints). The review paper also concludes by suggesting future research should also consider the role of employee moods, intrinsic motivation, self-efficacy (confidence), self-identity and social networks, as these factors may also play a key role in the creativity process.

Creativity is a multi-level construct fostered by both individual-level factors and firm-level factors. In terms of measuring creativity, recording the number of daily employee suggestions and ideas would allow the organisation to gain insights into the creativity process of the workforce. For example, where the number of suggestions is low, this may be as a result of organisational barriers to idea-sharing (Shalley et al 2004). Employee surveys

in particular are helpful in measuring these constructs. It is also important to link creative ideas to firm-level innovation outcomes, that is, how many ideas result in process changes and improvements, new products or patents. Again, the relevance of HC emergence is underlined.

Employee innovation

From an organisational standpoint, there are many different types of innovation, including product innovation, process innovation, marketing innovation and organisational innovation. At the individual level, innovation is being increasingly linked to employee attitudes. While employee attitudes can influence innovation, they can also disrupt or prevent innovation (Antons and Pillar 2015). Adopting negative attitudes, such as the 'not invented here attitude', stems from the idea that employees often reject new external ideas. Antons and Pillar (2015) argue that this is a function of their attitude, that is, ego-defensive, value-expressive, social-adjustive, knowledge-restrictive and utilitarian function:

- **The ego-defensive function** – the ego-defensive function relates to the idea that individuals might block information or new ideas proving or suggesting that others are more competent than they perceive themselves to be. In a corporate context, managers and developers often define and express their self-identity through their expertise in a specific domain and may reject external ideas that they may feel undermine their expertise or abilities.
- **The value-expressive function** – the value-expressive function is based on the idea that employees may reject external ideas that do not align with their own personal values. For example, Antons and Pillar (2015) cite the example of an environmentalist who may reject product ideas that contain potentially toxic materials or require air-polluting production processes, even if the products could increase customer welfare. Conversely, employees may be more likely to accept ideas which adhere to their own personal values (Klein and Sorra 1996).
- **The social-adjustive function** – according to Chang et al (2012), the social-adjustive function relates to the concept of social identity and the observation that exchange and co-operation between teams and groups having different social identities can be impeded by social norms of groups: for example, organisational teams which reject ideas from outside their closely knit group.
- **The knowledge-restrictive function** – employees may restrict ideas that do not align with their own areas of expertise. As Antons as Pillar (2015, p201) highlight, '*Striving for cognitive consistency, people filter out new information that challenges their attitudes and adopt information that is in line with their attitudes.*' An example may be an automobile engineer who has expertise in developing combustion engines rejecting an idea based on the development of new electric motors.
- **The utilitarian function** – finally, the utilitarian function relates to employee self-interest. The key observation here is that employee self-interests, accentuated by employee rewards, may lead to undesirable innovative behaviour. Consider, for example, developers or product managers who are rewarded for the number of ideas or development projects generated. In such a situation, external ideas may be rejected because of the sheer utilitarian function of the not invented here mindset. Besides monetary rewards, creating one's own ideas may also simply be more prestigious than adapting an external idea, as it fosters intrinsic motivation via peer recognition or social status in an organisation (Antons and Pillar 2015).

The key goal for management is to challenge these attitudes towards innovation and create an environment where creativity and innovation can flourish. This may involve rotating team members on a project basis (that is, measuring the number of rotations), integrating employees into decision-making, restructuring teams and departments, gaining experience with external knowledge, and establishing adequate incentive systems. By tackling the micro-foundational barriers to innovation, firms can set the scene for the development of unit-level innovation capabilities and also facilitate organisational change.

Talent management

Talent management is an important individual- and unit-level construct. Under the HC framework, talent management is predominantly focused on developing talent from within the organisation. Hence, there is a strong focus on employee development and the operation of a fair and equitable succession programme. According to Dowell (2010) '*talent management is an integrated set of processes, programs and cultural norms in an organisation, designed to attract, develop and deploy and retain talent to achieve strategic objectives and meet future business needs.*'

It has already been highlighted that the HC approach to talent management favours developing employees from within. Hence, organisations operating under the HC model often favour internal recruitment over external recruitment. This is because the organisation has invested valuable resources in developing the employee, allowing them to reach their full potential (Thomas et al 2013). However, not all roles can be filled internally and it is vital that firms have a strategy in place for the recruitment of upcoming talent which fits with the organisation's strategy.

Internal recruitment and employee succession

According to Fuller and Huber (1998), there are four distinct internal recruitment activities, including promotions from within, lateral transfers, job rotation and rehiring former employees. Employee flexibility (job rotation and lateral transfers) and employee development and succession (internal promotions) are two concepts that are receiving a substantial amount of attention in the talent management literature.

In recent years, there has been a growing emphasis on employee flexibility. As firms often operate in turbulent environments, employees are often required to change their work practices and upgrade and/or expand their range of skills. Many firms working in these environments favour an agile workforce, for example, the IT industry or high-technology industries. Moreover, as many organisations operate team structures, employees now often have knowledge of a multitude of roles and skills (Taylor 2014). In such environments, job rotation or lateral transfers may be an option for employers seeking to fill job vacancies or skills gaps. The benefit of job rotation is that employees are kept stimulated and, as employees are already embedded in the firm's organisational culture, the employee can quickly transition to their new role (Mahoney and Kor 2015). One of the main criticisms of employee flexibility, however, is that the practice does not lend itself well to task proficiency, as one often attains general skills as opposed to firm-specific skills. On the other hand, this limitation may be offset by other important benefits. For example, research by Bhattacharya et al (2005) found that skill flexibility was related to cost-efficiency, as a greater skill variety, and their application, lower the requirement for additional employees.

In terms of internal promotions, employee succession programmes are fundamental for ensuring that an organisation has a pool of employees with the ability, knowledge, personal attributes and experience necessary to fulfil senior roles when they become vacant (Taylor 2014). The benefits of internal succession, as opposed to external succession, is that employees are familiar with the organisation and its culture, hence the risk of an unsuccessful appointment is reduced (Charan 2005). Moreover, employees can maintain their social networks and can therefore quickly acclimatise to new roles (Taylor 2014). Firms can facilitate employee succession by having a senior employee mentor a junior employee (Bower 2007). Moreover, the mentee should be required to take responsibility for the mentor's tasks from time to time. This simplifies the passing of the torch and, as mentioned earlier, allows for a more comfortable transition to a new role.

An organisation's succession plan must also promote equality and diversity. In other words, succession plans must be centred on the individual's ability, performance and degree of fit for the role that they are considered for. Moreover, succession programmes should not discriminate against individuals by gender or race, otherwise this can lead to perceived lack of procedural and outcome fairness and undesirable job behaviours (Adams 1963). Recent research has shown that perceived unfairness or inequality impacts how employees reciprocate, that is, commitment (Seifert et al 2015). Such developments may ultimately lead to a decline in productivity. In this sense, fair and equitable evaluation procedures, augmented by diversity training initiatives, become important considerations for promotions and succession planning.

External recruitment

When internal recruitment is not an option, or firms favour a radical reshuffle of leadership, they may turn to the external labour market. Employers need not face the external market in the dark; building talent pipelines such as constructing specific relationships with colleges or consultancy firms, providing employee apprenticeships, encouraging informal recruitment (that is, tips from current employees) and carefully selecting candidates (matching) can all go a long way to securing the best employees for the organisation (Hatch and Dyer 2004, Ready and Conger 2007, Collings 2009, Taylor 2014).

In terms of employee matching, Hatch and Dyer (2004) find that screening employees based on educational and organisational requirements can have favourable outcomes for employee learning further down the line. Moreover, Ployhart (2006), and Taylor (2014) highlight that organisations are now matching employees based on personality and attitudes (that is, ambition and so on) in order to forecast future employee engagement and workplace behaviours. These advanced matching techniques reduce the amount of risk in the external labour market by enabling the firm to secure candidates that are more likely to prosper in the organisation.

Apprenticeships can also be an effective external recruitment tool. Apprenticeships can also facilitate the development of employees, which in turn can be monitored by employees and used to gauge or forecast future performance. Finally, informal recruitment can also help employers identify new employees. For example, existing employees may be able to recommend individuals who they believe would be a good fit for the organisation (Brymer et al 2014).

Finally, not all organisations may have access to talent pipelines. In this case, it is important that employers are able to tailor job offers to the employees they need to attract. While competitive wage rates and other monetary perks are obviously attractive, employees in the knowledge sector are increasingly looking at non-financial job rewards. For example, Schlechter et al (2015) found that non-financial reward elements such as work–life balance, learning and career advancement increase the perceived attractiveness of a job offering. Gender was further found to have a significant effect, indicating that the presence of non-financial rewards was more attractive in job offerings for women than for men. Schlechter et al (2015) found that organisations may benefit by implementing and/or emphasising non-financial rewards as part of a total rewards package when they attempt to attract or recruit potential employees. Moreover, organisations that seek to attract a higher number of female employees may benefit from the results by incorporating or further emphasising non-financial rewards as part of a targeted job offer.

Talent development and deployment

It has already been highlighted that organisations must offer employees opportunities for personal growth and development. This may include providing opportunities for promotion (Benson et al 2004). However, where internal promotion is not viable, new learning opportunities and skill variety initiatives such as job rotation may prove to be practical alternatives (Wrzesniewski et al 2010, Stahl et al 2012, Taylor 2014). For example, encouraging internal and external learning through workshops will allow upcoming talent to expand their skillset and also broaden their horizons in terms of what they can achieve within the organisation. Job rotation can also be a powerful development tool. For example, many high-performing or experienced employees often have transferable skills which suit a wide variety of roles or tasks (Taylor 2014).

Job rotation can also facilitate effective talent deployment. For example, employers can measure the employee's performance in a variety of different tasks and roles. This enables the employer to identify the employee's most effective role in which they add the most value for the organisation (Taylor 2014). For example, an employee skilled in engineering, who also has a creative flair (that is, makes frequent innovative suggestions), may be better positioned to have an R&D role within the organisation.

Stahl et al (2012) have found that despite their belief in the effectiveness of job rotations, firms seem to lack the ability to implement them. A possible explanation for this gap involves 'silo thinking', that is, the tendency of managers to focus on the interests of their own units rather than the whole organisation, which in turn may hinder talent mobility within the company and undermine the effectiveness of job rotation as a career development tool. A study by Guthridge et al (2006) has found that more than 50% of interviewed CEOs, business unit leaders and HR executives believed insular thinking and a lack of collaboration across the organisation prevented their talent management programmes from delivering business value.

Talent retention and reward

The direct economic costs associated with losing talented employees include the costs of replacing an employee, the exit of the employee, and the downtime that occurs as a result of the employee exit (Hagen Porter 2011). Moreover, the firm incurs the cost of recruiting, interviewing and training a new hire (Hagen Porter 2011). Other estimates of associated costs for losing and replacing employees vary between 1.5 and 2.5 times the annual salary

paid for a job (Cascio 2006). Alongside the economic costs of losing employees, indirect financial costs could include work disruptions, loss of organisational memory along with tacit or strategic knowledge, losses to productivity or customer service, loss of mentors, or even additional turnover of other valued employees.

Hence it is imperative that employers are able to manage and measure the factors that influence retaining employees. Benson et al (2004) find that employees earning postgraduate degrees are less likely to leave an organisation when offered a promotion. Moreover, Thomas et al (2013) highlight that a more tailored approach to employee rewards can discourage employees from leaving an organisation. Thomas et al (2013) cite the case of an organisation in an industry undergoing great technological change. Essentially the organisation was able to identify through survey measurement a misalignment between the firm's new employees and the firm's existing reward system. Essentially, the reward system rewarded employees based on their experience or seniority and was more concerned with ensuring employees were awarded a generous pension. However, for younger workforce, who possessed new skills needed to carry the firm forward, this reward system was ineffective and led to high levels of turnover.

A further reason that many employees leave an organisation is that they often become bored or disengaged with their work, or feel that they are being constrained in their jobs. In this sense, job-crafting can be a powerful retention tool. Job-crafting is a means of describing the ways in which employees utilise opportunities to customise their jobs by actively changing their tasks and interactions with others at work (Berg 2007). According to Wrzesniewski et al (2010), employees can effectively turn the job they have into the job they want without having to be promoted or having to leave the organisation. Employers can also utilise job-crafting as a retention tool by encouraging task variety and allowing for job flexibility within roles. This in turn may reinvigorate (engage) employees and deter them from leaving the organisation (Tims et al 2013). So far there has been little research examining the impact of job-crafting on employee and firm outcomes. Finally, firms can encourage employees to invest in firm-specific skillsets and design job roles which promote the co-specialisation of assets, which may in turn lead to feelings of job embeddedness, thereby enhancing the likelihood employees will stay with the organisation (Charlier et al 2016).

2 Human capital at the organisational level

Contemporary human capital management theory: the firm level

The previous section examined the antecedents of HC at the individual level and also outlined for each construct why measurement is important. This section discusses HC at the organisational level. Moreover, as HC is a multi-level concept, the impact of HC resources on individual outcomes is also discussed (Ployhart et al 2014). However, the main focus relates to the impact of unit-level resources on best practices and competitive advantage, although the measurement of HC resources as they relate to firm-level outcomes is also covered.

The resource-based view (RBV) of the firm in the context of HC is first discussed, followed by both the capability and dynamic capability (DC) perspectives of the firm, and finally the knowledge-based view (KBV) is examined in order to ascertain how HC is conceptualised alongside social and organisational (structural) capital. Therefore, how the concepts intertwine to potentially create a knowledge advantage for organisations is illustrated. Additionally, within each theoretical framework, the antecedents of HC at the firm level (that is, leadership, talent management, firm structure, firm culture and change management) will be discussed (see Figure 3). For example, the DC perspective will heavily relate to change management and the role of leadership, while the KBV is shown to have a strong focus on the role of organisational climate and structure in facilitating HC development and competitive advantage. The section also illustrates the value of HC resource measurement and reporting alongside the antecedents of HC at the firm level.

Figure 3: Human capital at the firm level (adapted from Thomas et al 2013)



The section also illustrates the role which HC can play in the creation of competitive advantage, with a focus on firm-specific HC and how it can facilitate strategic outcomes. The idea of emergence is also discussed by outlining how employee-level HC initiatives can facilitate unit-level resources and capabilities (RBV and DCs), which in turn can be leveraged for competitive advantage.

The resource-based view (RBV)

Penrose (1959) introduced the concept of the RBV, which examines how firms create sustainable competitive advantage. Specifically, the theory looks at how organisations manage and deploy internal resources (Penrose 1959). Barney (1991) extended this view to argue that each organisation possesses a unique bundle of resources, capabilities and competencies and it is the combination of these which allows it to create sustainable competitive advantage (Teece et al 1997, Conner and Prahalad 1996). Thus, it is argued that the basis for a firm's competitive advantage lies primarily in the application of a bundle of valuable tangible or intangible resources. The RBV suggests that creating and exploiting specific investments in times of uncertainty is essential if firms are to attain long-term success.

Barney (1991, p99) argues that resources include *'all assets, capabilities, organisational resources, firm attributes, information and knowledge controlled by a firm that enable the firm to conceive and implement strategies that improve efficiency and effectiveness'*. He further states a firm's resources can be grouped into three categories, namely, physical capital resources, HC resources and organisational capital resources. However, it is important to note that regardless of the category grouping, any resource that creates a sustainable competitive advantage for a firm must have the following attributes (Barney 1991, p105):

- It must be **valuable**, that is, it exploits opportunities and/or neutralises threats in a firm's environment.
- It must be **rare** among a firm's current and potential competition.
- It must be **imperfectly imitable**; this can be for a number of reasons:
 - The ability of a firm to obtain a resource is dependent upon unique historical conditions.
 - The link between the resources possessed by a firm and its sustained competitive advantage is causally ambiguous.
 - The resource is socially complex, that is, knowledge-based.
 - The resource is non-substitutable.

Therefore, the key point is that the conditions for competitive advantage (valuable, rare, imperfectly imitable resources) also mirror the conditions for firm-specific HC. Specifically, when resources are valuable, rare and imperfectly imitable, it means that they are heterogeneous and not perfectly mobile. Recalling Becker's (1964) classification of firm-specific skills from section 1 of this review, it was argued that such skills are of little value to other employers, as they are often location-specific, socially complex, concern tacit learning and causally ambiguous (Barney 1991, Ployhart et al 2014, Wright et al 2014).

Accordingly, there is a strong case at the firm level for examining firm-specific capital under the RBV lens in order to facilitate best practices and competitive advantage (Hatch and Dyer 2004, Ployhart et al 2014, Brymer et al 2014). While these assumptions seem reasonable, Ployhart (2015) acknowledges that there is underlying theoretical baggage that suggests linking HC theory (HCT) to the RBV is problematic. For example, HCT concepts do not completely align with those from the RBV, mainly because they explain different questions, at different levels, and with different assumptions (Ployhart et al 2014). To overcome this barrier, Ployhart et al (2014) integrated the RBV into his own framework on multi-level HC and made a distinction between individual-level HC resources, which are available for unit-level purposes, and strategic HC resources, which facilitate competitive advantage. Strategic HC resources in particular have the best fit with RBV logic as they pertain to differentiation strategy and competitive advantage (Barney 1991, Crook et al 2011, Nyberg et al 2014, Ployhart et al 2014, Ployhart 2015). At the firm level, firms can deploy HC resources in a number of ways depending on the specific organisational strategy and proposed outcomes – for example, competitive advantage, cost advantage, improved customer service levels.

Human capital resources and competitive advantage

The RBV has been applied in many studies referring to HC at the firm level. For example, in investigating the logic to the development of HC pipelines, Brymer et al (2014) argued that talent pipelines offer a set of mechanisms for the emergence of HC resources. For instance, when firms develop talent pipelines, they often hire talent from the same sources, such as a specific university or consultancy firm. According to Brymer et al (2014), this facilitates the homogenisation of knowledge, which in turn enables the development of path dependencies and unique organisational routines that lead to improved financial performance and differentiation, ultimately leading to competitive advantage. The logic behind this observation is that organisations which consistently hire through the same high-quality pipelines develop

employees that have similar mental models, facilitating the development of tacit knowledge. Furthermore, when firms repeatedly hire from the same sources, stronger social ties may be facilitated as organisational events (for example workshops and apprenticeships), which may mean that employees arrive already prepared for their new roles. Moreover, existing employees who came through the same pipeline can also make recommendations to management on upcoming talent.

However, Brymer et al (2014) also note that while HC pipelines can contribute to competitive advantage, an over-reliance on repeated inter-organisational hiring can lead to inertia and resistance to change. The Brymer et al (2014) study highlighted the idea of emergence, that is, individual-level capacities leading to unit-level outcomes. Specifically, the development of talent pipelines was linked to competitive advantage. In terms of measurement, firms could record the number of recruits from a specific pipeline and measure which pipelines facilitate the best-quality workers. This could be achieved by looking at promotion records and productivity levels. By selecting the highest-quality pipelines that also fit with corporate strategy, organisations can ultimately improve performance and differentiate themselves. For example, in a study into Boeing's recruitment and selection practices, Fischer (2013) illustrated how Boeing consistently attempted to attract new recruits from a select group of top engineering schools.

Other studies which have examined the RBV have noted how unit-level constructs impact unit-level outcomes. For example, Kor and Leblebici (2005) employ the RBV to test a theory of how firms can successfully deploy and develop their strategic human assets/resources while managing the trade-offs in their service and geographical diversification strategies. In a sample of large law firms, it was found that, even though firms profit from expert human-capital-leveraging strategy and service and geographical diversification strategies individually, pursuing these strategies simultaneously at high levels produces negative interaction effects on profitability. Additionally, internally developed, firm-specific HC will allow for more effective HC leveraging. Alternatively, external hiring may help to build new knowledge bases and allow the organisation to take advantage of other opportunities. Crucially, however, the results show that pursuing high levels of both expert HC-leveraging and external hiring of associates results in lower profitability.

Studies have also examined the impact of unit-level resources on individual constructs. For example, Salanova et al (2005) examined the role of organisational resources and workforce engagement on employee performance and customer loyalty. The study also employed service climate as a mediator between the aforementioned variables. Surveys were distributed to both employees and customers with the goal of measuring service climate, employee performance and customer loyalty. Customers were asked to rate employee performance on two different constructs, namely empathy and job performance. The results demonstrated that organisational resources (learning, autonomy and technology) and work engagement predict service climate, which in turn predicts employee performance and, subsequently, customer loyalty. Although other authors, such as Eldor and Harpaz (2016) and Aryee et al (2016), have attempted to examine how unit-level resources impact individual performance, like many others they did not apply the RBV. When searching for literature that did apply RBV to examine how unit-level outcomes impact individual outcomes, it was found that there was a scarcity in research, which is a limitation of the RBV–HC literature. However, another stream of resource-based literature did appear to

examine the reverse relationship; that is, rather than examine how HC resources contribute to competitive advantage, studies examine how HC losses impact firm performance and firm survival. This will now be discussed in greater detail.

Human capital losses: a resource-based-view perspective

Shaw et al (2013) found that HC losses (for example, turnover rates) negatively impact organisational performance; however, the workforce performance relationship takes the form of an attenuated negative relationship (the severity decreases) when HRM investments (for example, training, pay, benefits) are high. The logic behind this is that HRM investments help build firm-specific HC and, as these accumulations are diminished through employee turnover, the path dependencies, routines and social complexities associated with the long-tenured workforce are also erased (as predicted by the RBV). Moreover, competitors can more easily imitate the remaining resources and eliminate competitive advantages. However, the authors also found that progressive losses are less severe over time – an observation based on learning curve theory. For example, with low turnover, the firm-specific HC accumulations of average employees are quite high; someone leaving generally means that the firm is losing an employee who has ‘progressed down the learning curve’. Crucially, this learning curve development is enabled by HRM investment.

Similar to the theory on firm-specific HC, learning curve theory concerns skill and ability levels as they relate to reduced performance errors and high job-related memory retrieval (Logan 1992, Ohlsson 1996) – that is, they concern employee ability to perform at a level higher than that possible with simply an accumulation of general skills. When turnover is low, it is time-consuming for a new employee to build specific HC that is equivalent to the existing employees. However, when turnover is high, average firm-specific HC accumulations are low by default, as replacements can build the equivalent HC and attain the leaver’s performance level quickly. Thus, when turnover rates are high, an organisation typically replaces a short-tenured employee (with few firm-specific skills) with a new employee who soon represents the same level of HC accumulation and shows equivalent performance (Shaw et al 2005). Therefore, performance-based losses of HC depletion are the most damaging at the outset for firms who invest heavily in HRM activities, but the negative performance evens out at higher turnover levels. Alternatively, when organisations invest little in HRM, HC depletions do not significantly relate to workforce performance, as HC losses are essentially irrelevant in terms of performance in organisations with low HRM investments as they had very little firm-specific capital initially.

Kwon and Rupp (2013) challenge the logic of Shaw et al (2005, 2013), suggesting that firms who invest a greater amount in HRM practices will have a larger talent pool and ‘buffer’ employees to cover roles in the event of turnover, while firms who invest less will not have any skilled workers to fill roles. Therefore, the authors hypothesise that the negative impact of employee turnover on financial performance will be strongest for firms who invest less in HRM practices. However, the empirical results from their study demonstrated only partial support for this theory, as while it was shown that return on equity was significantly impaired after employee mobility events in low HRM investment firms, return on assets (ROA) was unaffected. Pennings et al (1998) examined the impact of human and social capital on firm dissolution and found evidence both were strong predictors of an organisation being wound

up. It was found that the degree of specificity and non-appropriability of such capital was seen to diminish the dissolution of professional service firms.

Thus, the greater the degree of firm-specific HC and social complexity of the firm's HC resources, the greater chance of survival (Pennings et al 1998); conversely, the greater the degree of firm-specific HC losses, the greater the chance of dissolution. Finally, Campbell et al (2012a) found that higher-earning employees are less likely to leave compared with those on lower earnings, but if they do, are more likely to create a new venture rather than join another firm. Interestingly, the authors found that employee entrepreneurship has a larger adverse impact on firm performance than an employee moving to an established firm, even controlling for observable employee quality. This is because higher-earning employees often end up competing with the focal firm. Furthermore, because the employee is starting their own venture, as opposed to joining another organisation with different operating principles, they will be able to transfer some of their firm-specific capital or resources. The authors conclude by suggesting that in knowledge-intensive settings, managers should focus on tailoring compensation packages to help minimise the adverse impact of employee entrepreneurship, particularly among high-performers.

Generally, studies by Pennings et al (1998), Campbell et al (2012a) and Shaw et al (2005, 2013) show that HC losses, specifically employees with firm-specific skills, can be detrimental for firm performance. Hence, it is vitally important firms are able to develop firm-specific capabilities as it appears to be a strong predictor of both performance and survival (unit-level outcomes) (Brymer et al 2014, Pennings et al 1998, Shaw et al 2005, 2013). Therefore, these studies also indirectly suggest that measuring voluntary turnover rates and the opportunities provided for the development of firm-specific capital is pivotal to organisational sustainability. This may include measuring the levels of on-the-job training and correlating the outcomes of this with firm performance, for example customer service. Finally, measuring the collective engagement and satisfaction levels of the workforce also becomes vital as they can help reduce turnover (Saks 2006).

The capability and governance perspective

A criticism of the RBV is that while it focuses on firm resources, it is limited in explaining how they can develop over time to form organisational competencies or capabilities (Priem and Butler 2001). More precisely, Makadok (2001) argues that the RBV of the firm is predominantly focused on deciding which strategic resources (physical, human or organisational) to deploy to generate rents, while the capability approach is focused on building, or extending, these resources to develop firm capabilities. For example, an organisation may have a talented and highly educated workforce, but if the employees do not invest in on-the-job training, they cannot build the firm-specific competencies that enhance performance. Hence, the capability view is considerably more detailed in relation to how organisations develop firm-specific competencies. For example, as Mahoney and Kor (2015) highlight, capabilities often stem from combining human resources with other organisational assets (co-specialisation), that is, HC interacting with social or organisational capital.

Co-specialisation exists when the value generated by two or more assets used in combination is substantially greater than the value of each asset in its next best use: for example, a scientist interacting with the firm's patents to create new innovation capabilities or a newly trained employee benefiting from the firm-specific experience of a tenured operations manager (Mahoney and Kor 2015). In these examples, the employee can build on existing resources to create new firm-specific capabilities (Subramaniam and Youndt 2005). However, it is noteworthy that when knowledge is co-specialised or complementary, the likelihood that an employee will leave the organisation is reduced (Charlier et al 2016, and in the event that they do so, they will have great difficulty transferring co-specialised knowledge to another organisation as its complexity makes it largely location-specific (Groysberg et al 2008, Campbell et al 2014, Liu 2014, Mahoney and Kor 2015). According to Mahoney and Kor (2015), the three key components of firm-specific HC which facilitate the creation of capabilities are:

- the experiential knowledge of the firm's idiosyncratic resources, co-specialised capabilities, systems and routines
- the collective shared knowledge of the firm's employees' (and managers') strengths and shortcomings and the trust embedded within specific relationships and the firm's organisational culture
- the explicit and tacit knowledge about the key constituents and stakeholders of the firm.

Mahoney and Kor (2015) highlight that when a firm relies heavily on external recruiting to develop its HC base, the new employer will incur adjustment costs to make the employee 'productively reliable' within its unique resource systems. Such a policy requires substantive organisational investments in formal and informal training in a systematic fashion. Moreover, Groysberg et al (2008) warn of the risks of hiring 'star' employees from other organisations, finding that stars who switch employers experience an immediate decline in performance that persists for five years. This decline was more pronounced among stars who moved to organisations with lesser capabilities and without other team members, while those who moved to firms with equivalent capabilities also exhibited a drop in performance, but this only lasted for two years. Finally, those who switched to a firm with better capabilities, and those who moved with other team members, exhibited no significant decline in short-term or long-term performance. Groysberg et al (2008) attribute the non-transferability of firm-specific skills to the decline in performance at the new employer. The results of their study also provide a strong argument for firms developing HC capabilities from within, rather than turning to the external market for 'star' employees.

Linking human capital capabilities to strategy

There have been a number of studies which have employed the capability-based perspective to examine how HC investment can facilitate employee- and firm-level capabilities, that is, HC emergence. For example, Vidal-Salazar et al (2012) found that investment in employee training build the type of employee capabilities that facilitate competitive advantage and that employee training (number of hours) as opposed to employee training diversity (different skill training) enhances collective employee knowledge. Their study also found that employee training boosts workforce commitment, which in this case is influenced not only by the training effort made (average number of training hours),

but also the number of different courses attended. The authors reason that employees positively value being able to take the courses offered by their company, irrespective of their duration, which in turn directly influence their organisational commitment. Finally, the study found that employee training was not related to the 'collective mind' (similar ways of thinking) of the organisation; this was because as the study related to formal professional training rather than informal training, the collective mind variable was not positively related to training. Informal training can often occur where the most experienced employees teach the youngest or least experienced, or where employees learn by trial and error or iterating with colleagues. This type of training is much more flexible and encourages fluid communication between members, which is essential for the creation of a collective mind. In a study by Donate et al (2016), it was shown that the use of interrelated, high-profile personal HRM practices such as selective staffing, training and high-compensation systems was positively related to a firm's level of HC. In turn, HC mediates the relationship between high-profile personal HRM practices (as a collective, firm-level system) and a firm's innovative capabilities.

The importance of asset co-specialisation in relation to firm-specific capability development is also acknowledged in the literature. For example, Subramaniam and Youndt (2005) found that organisational (structural) capital positively influences incremental innovative capability, while HC interacts with social capital to positively influence radical innovative capability. Crucially, however, HC by itself was negatively associated with radical innovative capability. Hence, the importance of asset co-specialisation (that is, human and social capital) for the development of organisational capabilities is underlined. This observation will be discussed in greater detail in the next section. The development of firm capabilities is also important for pursuing different strategies and goals and obtaining corporate outcomes (Porter 1985). For example, firms pursuing a lean operations strategy will need to ensure that employees are trained in cost-efficient production and quality management in order to increase product quality and enhance customer satisfaction (Basu 2012). Conversely, a firm pursuing a differentiation strategy may encourage employee exploration and creativity (Porter 1985). Firms can measure and analyse the impact of training on different firm-level capabilities. For example, a lean operations strategy would involve measuring the impact of lean training on efficiency accounting measures such as ROA (operating income/total assets), employee productivity (operating income/number of employees) and manufacturing cost-efficiency (manufacturing costs/total costs) (Lo 2007, Lo et al 2009, 2012). The firm could also measure the impact of employee training on quality management metrics such as the firm's operating cycle (debtor days + inventory days), where a faster operating cycle indicates fewer defects as firms receive faster payment (Lo et al 2009). All of these measurements can be obtained from the firm's annual accounts and give insight into capability development. These strategic HC metrics will be discussed in greater detail in section 3.

Finally, it is important to highlight that some organisational strategies are likely to have a greater impact than others in regards to HC capability development. For example, many organisations have turned to an outsourcing strategy in recent years to reduce costs and/or increase flexibility. However, Mayer et al (2012) find that a knowledge project is less likely to be outsourced when it requires and develops high levels of firm-specific or industry-specific HC. This is consistent with both transaction cost economics (TCE) and the capability perspectives, which argue that firm-specific HC should decrease the need for outsourcing. Overall, the results suggest that firms have an organisational advantage in containing firm-

specific and industry-specific activity within their own boundaries, as it facilitates the development of firm-specific capabilities. Moreover, while it is one thing for a firm to be able to develop firm capabilities, it is entirely another to encourage employees to invest in these.

Corporate governance and the appropriation hazard

The above sections highlighted that investments in firm-specific capital are vital for building capabilities. However, as Mahoney and Kor (2015) and Ployhart (2015) highlight, employees may be reluctant to make investments in firm-specific capabilities as they are subject to what's known as the appropriation hazard. For example, within the strategic HC literature, employees with firm-specific skills are seen as highly valuable, as they possess specialised skills and tacit knowledge which may contribute to overall firm performance. Accordingly, such employees would be difficult and costly to replace. Hence, as Coff and Raffie (2015, p238) highlight, *'as long as employees with firm-specific skills are compensated for the extra value associated with their specialised skillset, employee mobility will be associated with a monetary penalty'*. Nevertheless, different scenarios may arise within organisations and tensions may exist between the employer and the employee in relation to investments in firm-specific HC. There are a number of reasons for these tensions. First, employees may be reluctant to develop firm-specific skills as they may perceive that this investment may limit employment opportunities at other organisations. Second, employees may also be reluctant to make such investments out of concern that the firm will act opportunistically (Williamson 1985, Coff and Raffie 2015, Molloy and Barney 2015). For example, a firm may ask an employee to make a firm-specific investment that could generate significant value for that firm in return for a payment sometime in the future from the cash flows created by this investment. Once the employee has developed the requested firm-specific HC, an employer may renege on the promised future payment and the employee would not have recourse. Thus, the employer would capture the full value of the investment; so unless some protections or safeguards are implemented, employees will be reluctant to make such investments.

To avoid this scenario, Mahoney and Kor (2015) argue that the field of strategic HC would benefit from a corporate governance perspective with specific attention to employee safeguards. The authors argue that to ensure employees make firm-specific investments, there must be some incentive for them. Consequently, they recommend that direct payment, sharing the proceeds of generated value with the employee and allocating individual property rights for employee innovations, could motivate employees to make firm-specific investments. Indeed, Wang et al (2007) found that firm–employee relationships fully moderate the relationship between firm-specific knowledge assets and firm performance, whereas stock ownership programmes only partially mediate it. However, the authors did not consider other investment mechanisms such as promotion or opportunities for board membership. They also felt that future research needed to analyse whether certain employee incentives are interrelated in that they can be either complementary or substitutive. Generally, research demonstrates that governance mechanisms and rewards can help ensure that the aforementioned stand-off scenario does not materialise and firms can develop firm-specific HC capabilities.

Other researchers have criticised the TCE appropriation hazard perspective of HC for not representing the reality of labour markets. For example, Coff and Raffie (2015) highlight that appropriation hazard theory relies on information symmetry where employers and

employees have accurate perceptions of what constitutes general and firm-specific skills; however, in reality, employees rarely consider their skills from a general or firm-specific standpoint and, even if they did, may view their skills as general when in fact they are firm-specific, and vice versa. The same goes for how employers view their employees' skillsets. Other problems include the employer or employees undervaluing or overvaluing general or firm-specific capital (Campbell et al 2012a).

Accordingly, Coff and Raffie (2015) propose relaxing some of the assumptions of TCE, as they do not reflect the reality of imperfectly competitive markets. Hence, the firm-specificity of HC may not predict mobility (Campbell et al 2012a). Instead, Campbell et al (2012a) suggest focusing on supply-side constraints by creating attractive employee incentive packages. Such low-cost, high-utility, firm-specific packages may include access to social networks, locations or perquisites such as a work environment that rivals are unable/unwilling to imitate. Hence, whether appropriation hazards are acknowledged or not, the use of incentives is important for retaining employees. Firms may measure different rewards on organisational outcomes to see which work best. In the case of a knowledge organisation, allocating individual property rights for employee innovations or providing opportunities for development may prove fruitful (Mahoney and Kor 2015). So far little research has measured the relationship between governance mechanisms and employee and organisational outcomes. However, measuring the effect of increased promotions and/or opportunities for learning on variables such as discretionary employee behaviour may be beneficial. For example, Eldor and Harpaz (2016) found that a learning climate (which includes opportunities for development), predicated engagement, which in turn influenced extra-role behaviours such as creativity and proactivity. Moreover, these particular behaviours may be crucial for firms operating in industries characterised by changing customer demands, that is, where rapid product innovations and workforce adaptivity are necessary for success; thereby, firms can link intrinsic rewards to strategy.

The next section of the report discusses a second set of organisational capabilities, namely, dynamic capabilities (DCs) which enable the firm's workforce to adapt in turbulent environments and respond to changing customer needs (Kor and Mahoney 2005). These DCs are particularly valuable to firms adhering to an 'agile' operations strategy, where the responsiveness and flexibility of the workforce is paramount, as opposed to a lean operations strategy, where the focus is on specific routines and focused training; however, DCs are sometimes important to both types of strategy.

Dynamic capability theory (DCT) and change management

Previously we discussed different academic perspectives of HC, the concept of HC acting as an enabler of organisational change was briefly discussed (Schultz 1961, Nelson and Phillips 1966). Evidence suggests that many firms now operate in increasingly dynamic and turbulent environments where disruptive forces such as technological innovation, global competition and entrepreneurship more typically emerge (Schreyögg and Sydow 2010). Moreover, in such environments, firms need to be able to reinvent and transform their constituent resource base, knowledge routines and capabilities in order to remain aligned with, or even ahead of, their external environment (Danneels 2002). DCT has been introduced to gain a better understanding of firm adaption and how competitive advantage is gained and maintained over time in changing environments. It is a relatively new theory when compared with the RBV, yet in many ways DCT can be described as an extension of

the latter (Helfat et al 2007, Ambrosini et al 2009). As the theory is relatively new, it has not been applied in as many studies as the RBV, which also means that on a conceptual level, the theory is still the subject of debate. More recently, however, it is seeing increased use in studies relating to firm performance (see for example Kor and Mahoney 2005, Rothaermel and Hess 2007, Ambrosini et al 2009, Hsu and Wang 2010, Barrales-Molina et al 2013).

It is argued that DCs are distinct from traditional capabilities, which pertain to the current operations of an organisation, and refer to '*the capacity of an organisation to purposefully create, extend, or modify its resource base*' (Helfat et al 2007). In essence, DCs examine processes for renewing or reconfiguring an organisation's existing resources. Teece et al (1997) extended this definition to emphasise the importance of external change, stating '*dynamic capabilities refer to the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments*'. As demonstrated above, both definitions emphasise that DCs help the firm adapt or evolve in times of change. Increasingly, DCT is being applied to the fields of HC and knowledge management because of the observation that the former can be leveraged as a capability for change (Wang et al 2012). For example, an organisation implementing an environmental strategy because of pressures in their external environment will rely on the workforce's absorptive capacity to develop creative environmental solutions in order to bring about knowledge routines based on sustainable operational practices (Russo 2009).

According to Cohen and Levinthal (1990), '*absorptive capacity is the ability to value, assimilate and apply new knowledge*'. Therefore, as Wang et al (2012, p1131) highlight, '*the dynamic orientation represents the ability to prepare, extend, and renew the entire IC stock by readjusting and adapting a firm's knowledge resources to changing strategic goals based upon dynamic market and technological conditions*'. As many firms now operate in fast-paced, knowledge-intensive industries, they need to be able to respond to changing customer demands, which may mean adhering to an agile operations strategy (Lee 2004). In this scenario, DCs, which enable workforce flexibility and adaptability, become invaluable and can also serve as a strategic response in times of external shocks and risks, for example a global recession (Kim and Ployhart 2014).

The development of dynamic capabilities

According to Rothaermel and Hess (2007), DCs can be constructed across individual, firm and network levels. Studies examining the development of DCs typically focus on elements such as HRM practices, for example job rotation, management experience (Kor and Mahoney 2005), absorptive capacity (Kor and Mahoney 2005), organisational learning (Barrales-Molina et al 2013), innovative capabilities (Rothaermel and Hess 2007, Hsu and Wang 2010, Barrales-Molina et al 2013), marketing capabilities (Kor and Mahoney 2005, Hsu and Wang 2010) and managerial vision and transformational leadership (Pandza and Thorpe 2009). It is noteworthy that all these factors, to some degree, enable organisational adaptation and flexibility. The idea of HC emergence can also facilitate the development of DCs. For example, at the employee level, an HR function operating a job rotation initiative may find that employees can quickly transition between different production set-ups because of increased skill diversity and flexibility. Another example may be a suggestion scheme initiative, which enables employees to contribute ideas to new product developments. In both cases, the workforce is able to respond to rapidly changing customer demands.

At the organisational level, by implementing an environmental strategy, an organisation can utilise its R&D capabilities to redesign products so they can be recycled. Furthermore, a firm can use its marketing capabilities to reposition itself as one with a clearer ethos to look after the environment (Kor and Mahoney 2005, Hsu and Wang 2010). Thus, these DCs afford the firm greater flexibility so its workforce can adapt to changing environments. However, the firm's employees also have to be aligned with the new changes being introduced; otherwise the adaption strategy cannot work. This is where the role of firm management and leadership is crucial, as it is a leader's role to set the strategic vision and the management's role to align this vision amongst employees. Furthermore, both management and leadership must be able to analyse changing environments and quickly respond to these changes (Pandza and Thorpe 2009). For instance, Barrales-Molina et al (2013) found that only organisations whose managers perceived a high degree of environmental dynamism generated dynamic capabilities; hence the role of management in generating DCs cannot be underestimated (Eggers and Kaplan 2008). For example, a firm operating in an industry characterised by changing customer demands must be able to measure the current abilities of the workforce and introduce new training initiatives to quickly respond to new product development. Finally, the results of Barrales-Molina et al's (2013) study show that knowledge codification and technical innovation are significantly related to DC generation, as they heavily relate to a firm's absorptive capacity, which involves absorbing and applying new knowledge.

Corporate leadership also plays an important role in DC generation as it facilitates an innovative and transformational climate. Indeed, transformational leadership has been linked to innovative capabilities (Lee 2007, Pieterse et al 2009) and is defined as a leadership style that transforms followers to rise above their self-interest by altering their morale, ideals, interests and values, motivating them to perform better than initially expected (Bass 1985, Yukl 1999). It is contrasted with transactional leadership, which is based on an exchange relationship in which the leader makes clear what is expected of followers (Bass 1999, Yukl 1999). Hence, it's argued that transformational leadership leaves more room for employee flexibility and exploration, contributing towards the firm's innovative capabilities (Pieterse et al 2009). In a study of a Dutch government agency, Pieterse et al (2009) found that transformational leadership is positively related to innovative behaviour only when psychological empowerment is high. Conversely, transactional leadership has a negative relationship with innovative behaviour only under the aforementioned conditions. The conclusion reached by these authors is that followers with high psychological empowerment may view transactional leadership as controlling and demotivating at the expense of innovative behaviour; therefore psychological empowerment appears to be a predictor of innovative behaviour. Aside from transformational and transactional leadership, recent research by Naseer et al (2016) finds that repressive or despotic leadership can stifle creativity. Hence, the role of leadership in facilitating organisational change cannot be underestimated.

Dynamic capabilities: the flexibility–efficiency trade-off

It has been argued in the literature that there must be a trade-off between organisational efficiency and organisational flexibility; however, as Eisenhardt et al (2010) highlight, this does not always have to be the case. For example, a firm may have highly structured, firm-specific routines embedded deep within the interactions between its human and social capital, which lead to substantial efficiencies and cost savings. However, if firms can absorb

and integrate new knowledge into these routines, they then become channels for adaptation and change. Moreover, the firm can still retain or even enhance its efficiency levels, as ideas such as redesigning a product or a product's packaging can also result in enhanced cost savings. A study by Vanpoucke et al (2014) applies this DC approach to the development of supplier integrative capabilities and reveals positive results for both efficiency and flexibility. Hence, DCs can also be effective in relatively stable routine-based environments (Ambrosini et al 2009). Nevertheless, DCs may only suit certain organisations in certain contexts, for example in times of change or in fast-paced industries.

Outside these contexts, DCs may be ineffective and even damaging to firm performance (Protogerou et al 2012). For example, Wang et al (2016) argue that mechanisms such as job redeployment can actually discourage employees from investing in firm-specific capital if they perceive they will be transferred to a different organisational setting. However, for many knowledge organisations, DCs are important resources for leveraging HC and adapting to change in an effort to sustain competitive advantage. Moreover, DCs can be important resources for facilitating the development of new knowledge. For example, in a study by Hsu and Wang (2010), DCs were shown to mediate (or partially mediate) the relationship between IC and firm performance. In terms of measuring DCs, firms could examine metrics such as R&D intensity or expenditure (Kor and Mahoney 2005, Hsu and Wang 2010, Barrales-Molina et al 2013), marketing expenditure (Kor and Mahoney 2005), job-crafting behaviours (Petrou et al 2016), training diversity, perceived transformational leadership environments and knowledge codification outputs, for example firm publications or patents (Grubler and Wilson 2013). These 'agility-based' metrics will be discussed in greater detail in section 3.

Human, social and structural capital: consider multiple sources of value

The firm-level theories discussed so far in this report, that is, the RBV and capability perspectives, have focused solely on the human element of IC. However, this section aims to discuss how HC can interact with social and structural capital and vice versa to create a knowledge advantage; this perspective is known as the knowledge-based view (KBV).

The knowledge-based view (KBV)

The development of a distinctive subset of the RBV, termed the KBV, has been driven by the work of Kogut and Zander (1992), Grant (1996a) and Spender (1996), building largely on the earlier work by Cohen and Levinthal (1990). It has been argued that although the RBV recognises the key role of knowledge, proponents of the KBV maintain that the former does not go into enough detail (Grant 2002). Therefore, the RBV as a theory in its mission to understand the entire firm fails to develop required depth on its component parts. For instance, as Grant (2002) observes, it fails to distinguish between physical, human and organisational capital resources. Therefore, it basically views physical and intangible resources in the same light (Edvinsson and Malone 1997). Conversely, the KBV, and its subset, IC, place more emphasis on the creation, integration and measurement of intangible knowledge assets (Grant 1996a, Nonaka and Takeuchi 1995, Edvinsson and Malone 1997). Additionally, as the RBV is internally focused, the creation, development and maintenance of a resource advantage in relation to, say, knowledge or IC is not solely dependent on internal elements. Knowledge is a two-way process (Cohen and Levinthal 1990) that '*evolves over time*' (Gavious and Rabinowitz 2003, p452). Therefore, the internal focus of RBV fails to take into account how knowledge is acquired externally through, for example, the firm's

stakeholders. Furthermore, as the RBV is quite static in nature, it cannot account for how knowledge develops and changes over time (Gavious and Rabinowitz 2003).

The KBV *'focuses on knowledge as the most strategically important of the firm's resources'* (Grant 1996a, p110). Hence it has a good degree of fit with the principles of HC management (Becker 1975) and the conditions necessary for the development of firm-specific capabilities (Mahoney and Kor 2015). Sustainable competitive advantage from the KBV perspective is based on how an organisation manages and exploits asymmetries in explicit and tacit knowledge. Grant (1996a, p111) builds on this understanding by asserting that *'explicit knowledge is revealed by its communication'* whereas *'tacit knowledge is revealed through its application'*. Expanding on these observations, explicit knowledge is easier to communicate as it is often in the form of clearly codifiable information that can be transferred from one party to another; conversely, tacit knowledge tends to be 'stickier' and not easily transferred (Polanyi 1958). For example, tacit knowledge may relate to the various 'short-cuts' that staff may take to remedy inefficiencies or make improvements. These 'short-cuts' will not be formally written or discussed and are therefore difficult to transfer as they are internalised within the firm. Conversely, explicit knowledge can be eroded over time and therefore cannot be a source of sustainable competitive advantage. However, tacit knowledge can form sustainable competitive advantage because it is both unique and relatively immobile.

The issue of knowledge integration is core to Grant's (1996a) view: he discusses mechanisms for integrating specialised tacit knowledge and states that the key knowledge integration mechanisms pertain to rules, directions and routines, and the central organisational problem is one of co-ordination. The key idea behind this is that an organisation should seek to build tacit knowledge into its existing explicit knowledge mechanisms so it can pursue competitive advantage (Grant 1996b). For example, it is highly inefficient for a quality engineer to teach every production worker the concept of quality control. A more efficient means of integrating knowledge is for the firm to establish a set of procedures and rules for quality control. Moreover, Kaplan et al (2001) highlighted that when firms develop knowledge routines, that is, the integration of complex and co-ordinated patterns of behaviour, they can leverage these knowledge channels to pursue organisational goals and competitive advantage. For example, as Kaplan et al (2001) highlights, *'the KBV integrates at the group and the firm levels of analysis to what had been a construct only at the individual level of analysis. By so doing, it puts particular emphasis on the interactions among individuals and groups for knowledge-sharing and creation (like the development of routines), and ultimately the implications of such interactions for competitive advantage.'*

Theorists such as Szulanski (1996) argue, however, that transforming knowledge can be a complex process, and when it is difficult to move from one actor to another it is described as 'sticky'. Explicit knowledge tends to be less sticky as it can be communicated throughout the organisation. Conversely, tacit knowledge is often embedded in routines and difficult to communicate. Szulanski (1996) warns that sticky knowledge can inhibit the spread of best practices within the organisation. Thus, it may be difficult to transfer tacit knowledge to explicit knowledge, which would require codification and documentation. Podgórski (2010) argues that codification of tacit knowledge may be expensive and lead to excessive bureaucracy and may also result in more importance being paid to formal knowledge, thus both managers and employees might overlook its advantages. Nonaka and Takeuchi (1995) developed a model of knowledge transformation which contends that explicit knowledge can

actually be transformed into tacit knowledge, and vice versa. They argued that the key to knowledge-creation lies in the mobilisation and conversion of tacit knowledge (social processes) and developed the knowledge spiral, which was derived from their research on the innovation processes of Japanese firms. An example provided in Appendix 4 illustrates this model. Nonaka (2007) highlights that new knowledge always begins with the individual, with examples including an employee who draws on years of experience to come up with a new process innovation, or a manager's intuitive sense of market trends which leads to the development of a new product concept (absorptive capacity). This idea is then shared with colleagues and management (social capital) and, if the idea is good enough, implemented throughout the organisation (structural capital).

Human capital and absorptive capacity

The previous section on DCs acknowledged the importance of absorptive capacity in adapting and responding to changing customer demands. However, this section will now demonstrate that absorptive capacity is also an important aspect of both knowledge-creation and problem-solving within the context of the KBV. Absorptive capacity is, in many ways, an individual-level HC construct; however, it is often more synonymous with unit-level HC research as the concept is seen as a key element of both knowledge-creation (for competitive advantage) and organisational change (Zahra and George 2002). According to Cohen and Levinthal (1990), *'absorptive capacity is the ability to value, assimilate and apply new knowledge'*. Kor and Mahoney (2005) found that a manager's previous experience was linked to the effectiveness of R&D project deployment and concluded that *'the positive moderating effect of management experience on R&D deployments suggests that R&D investments are better managed when strategic managers possess firm-specific knowledge of resources and dynamic capabilities'*. In terms of developing problem-solving skills, Hatch and Dyer (2004) find that investments in on-the-job training enhances employee knowledge, which in turn boosts an employee's problem-solving skills and absorptive capacity, ultimately contributing towards competitive advantage. Moreover, Nonaka (2007) advocates the idea of allowing employees to experience new knowledge through job rotation, while Tortoreillo (2015) links the process of crossing internal social network boundaries, that is, unlinked business units (or structural holes), to absorptive capacity.

A study by Jansen et al (2005) on the antecedents of absorptive capacity finds that organisational mechanisms associated with co-ordination capabilities (for example cross-functional interfaces, participation in decision-making, and job rotation) primarily enhance a unit's potential absorptive capacity. Crucially, these mechanisms allow the workforce to access new internal and external knowledge. Furthermore, the study found that the organisational mechanisms associated with leveraging socialisation capabilities primarily increase a unit's realised absorptive capacity. Finally, studies have also operationalised or measured absorptive capacity in terms of an organisation's previous history of R&D investments (Cohen and Levinthal 1990, Nicholls-Nixon and Woo 2003, Kor and Mahoney 2005). Specifically, organisations which have a strong history of R&D investment will be more proficient in assimilating and applying new knowledge (Hsu and Wang 2010).

Hence, the aforementioned research relating to absorptive capacity suggests it is important that management in knowledge organisations are able to measure: (a) employee experience (for example their organisational tenure or the number of projects undertaken); (b) employee on-the-job training record (training hours and training type); (c) past R&D expenditures and

opportunities for internal and external learning; and (d) opportunities for job rotation, decision-making, cross-functional collaboration and knowledge-sharing (for example the number of cross-functional teams) (Jansen et al 2005, Hsu and Wang 2010, Vidal-Salazar et al 2012). Opportunities for learning may include measuring the number of internal and external workshops employees attend annually, while measuring job rotation may involve the number of times an employee has taken part in new job roles (Nonaka 2007). These variables could then be correlated with organisational outcomes such as the number of employee suggestions successfully implemented (Tucker and Singer 2012), or the number of annual patents, patent renewals and citations (Liu 2014). For example, Nicholls-Nixon and Woo (2003) examined the relationship between internal R&D and external R&D investments (a proxy measure for absorptive capacity) on patent outcomes in a sample of US pharmaceutical firms. They found that internal R&D was positively associated with patent output; however, external R&D (for example mergers, strategic alliances) was negatively related.

Furthermore, Liu (2014) examined the impact of the interactions of human and social capital on patent renewals and found that absorptive capacity mechanisms, such as working in a large team and working with a star inventor, were positively associated with patent renewals. Liu (2014) reasoned that working with a star inventor allows non-star employees to benefit from tacit knowledge spillovers and stated: *'These collaboration experiences allow non-stars to improve their knowledge and the collective improvement of the inventor team engenders more novel recombination of knowledge'* (p620). Liu (2014) also found that a larger team allows inventors to collate and recombine knowledge from a wider social pool, aiding patent renewal. Finally, Liu (2014) found that cross-functional collaboration increases the chance of patent renewal; therefore it is vitally important for organisations to measure the number of annual patents and citations to obtain an idea of their absorptive capacity and knowledge capital.

The benefit of absorptive capacity is that it allows employees to quickly assimilate and apply new knowledge, which can be particularly important for firms operating in environments or industries characterised by rapidly changing customer demands. Furthermore, absorptive capacity is an important antecedent of innovation as it relates to the process of capturing new knowledge and applying it within the employees' existing environment, which can lead to a number of creative ideas that can be shared throughout the organisation.

Social capital: knowledge-creation and dispersion

The crucial role social capital plays in knowledge organisations cannot be overstated. The interactions between human and social capital are fundamental for the development of firm-specific HC, organisational knowledge routines, socially complex procedures, and innovation and creativity outputs. As highlighted above, Tortoriello (2015) found that an organisation's social networks can be leveraged to help facilitate employees' absorptive capacity. More specifically, Tortoriello highlighted that the positive impact of external knowledge on innovation-generation is enhanced when individuals sourcing external knowledge span structural holes (unlinked internal units) in the firm's internal social network. Similarly, Grigoriou and Rothaermel (2014) find that firms with integrators and connectors (that is, relational stars) in their social network have a knowledge advantage in relation to the quantity and quality of innovative outputs. Innovative outputs were measured by the annual number of patents granted, while the quality of innovation outputs was measured by the

number of patent citations. The results of the analysis demonstrated that the presence of integrators and connectors (social networkers) in the firm's internal networks is fundamental to firm innovation.

Therefore, it is essential to create a climate of collaboration and knowledge-sharing at the organisational level. For instance, in a study of 136 US technology companies, Collins and Smith (2006) found that commitment-based HR practices (for example training, compensation and selection) were positively related to organisational social climates of trust, co-operation, and shared codes and language. In turn, these measures of social climate were related to the firm's capability to exchange and combine knowledge, which in turn enhanced sales growth and revenue from new products and services. Hence, the study highlights that the development of a climate for co-operation, trust and shared codes is fundamental to the development of social capital and organisational outcomes. Furthermore, Donate et al (2016) find that the use of interrelated, collaborative HRM practices, that is, work autonomy, broad job design, empowerment, teamwork and group-oriented incentives, are positively related to a firm's level of social capital.

In turn, social capital was found to mediate the relationship between collaborative HRM practices (as a system) and a firm's innovation capabilities. Moreover, at the opposite end of the social spectrum, Politis (2003) emphasised that it is also important to create a climate of interpersonal trust in order to facilitate knowledge acquisition, having found that the majority of the interpersonal trust dimensions employed were positively related to the variables of knowledge acquisition. Hence, it is important that organisations strive to create a culture of interpersonal and organisational trust, which in turn can facilitate knowledge-sharing and knowledge acquisition. Moreover, the measurement of perceived trust levels among employees is important, and corporate leadership also has a major role to play. For example, Srivastava et al (2006) and Liu and DeFrank (2013) find that positive constructive leadership, such as transformational and empowering leadership, can create an innovation climate, which enhances subordinate knowledge-sharing.

The role of structural capital

This section aims to illustrate how human and social capital can facilitate a firm's structural capital and vice versa. First, in terms of organisational capital, contemporary academic research suggests that a culture of diversity and equality can have a positive impact on human, social and organisational outcomes, for example innovation. A study by Armstrong et al (2010) found that diversity and equality management systems (DEMS) contribute to firm performance beyond the effects of a traditional high-performance work system. More specifically, they found that DEMS (which typically include diversity training and monitoring, recruitment, pay and promotion across minority or other disadvantaged groups) are positively associated with higher labour productivity and workforce innovation and lower employee turnover. The logic behind this argument is that a more equal and diverse workforce enables each employee to reach their full potential. Furthermore, their study found a positive link between workplace equality and diversity and innovation. It is possible that in an equal workplace, where employees from different races interact with each other frequently, communication and interaction barriers are eliminated, facilitating greater knowledge-sharing, or that employees from different cultural backgrounds can contribute new ideas based on their experiences. However, more research on employee diversity and innovation is required.

Notwithstanding, Cox (2001) believes a more diverse organisation can have greater success in attracting high-calibre employees and finds that the effective management of diversity can create a competitive advantage based on the factors of cost, the recruitment of high-calibre employees, creativity and innovation, market success and organisational flexibility. In terms of the measurement of diversity and equality, the Armstrong et al (2010) study favoured workplace surveys, the results of which were then correlated with output metrics such as labour productivity, workforce innovation and employee turnover. Other methods of measuring diversity and equality may be to measure things such as gender diversity across all positions, the number of diversity training sessions, the pay of different employee groups, the number of differently abled employees in the workforce, the number of workplace changes implemented annually and the number of LGBT employees. These variables can then be correlated to job outcomes such as knowledge-sharing and creativity, and firm-level outcomes such as innovation and competitive advantage.

From an organisational structure perspective, team structures can facilitate HC, social capital, knowledge-sharing and creativity. For example, Han et al (2014) demonstrate that MBA teams composed of students from different industrial backgrounds (that is, knowledge variety) and the number of years' work experience (knowledge disparity) have a joint mediating effect on team-bridging social capital, that is, social relationships derived from an organisation's external network. In turn, team social capital mediated the effects of knowledge diversity on team creativity. Hence, the make-up of teams, for example diverse employee backgrounds, can impact upon the creation of team social capital, which in turn impacts knowledge diversity and creativity. Thus, for firms pursuing an innovation strategy, considering the interaction between human and social capital in team-creation is important. Team structures are now favoured in many organisations as they facilitate knowledge assimilation and combination, knowledge-sharing, knowledge application and, more generally, the creation of social capital (Liu 2014). Furthermore, team-based structures enable knowledge co-specialisation and the creation of tacit knowledge. Therefore, the components of HC are not only location-specific but also colleague-specific. For instance, in a study of the National Basketball Association, Campbell et al (2014) find that when players move to another organisation, their performance declines. This is in line with Groysberg et al (2008), who found that when star employees switch organisations they suffer a drop in productivity, and argued that this is because firm-specific HC is largely location-specific and often depends on complementary organisational resources.

Interestingly, however, Campbell et al (2014) find that HC can also be colleague-specific, as when employees move as a team, the decline in performance in switching organisations actually diminishes. It can therefore be said that organisations which encourage team structures reduce the risk of the loss of valuable HC, as if a star employee does leave, the damage is lessened as the remaining team members will still retain the firm-specific HC. Hence, measuring the number of teams within the organisation is important, as they can be pivotal to the facilitation of human and social capital. Finally, according to Al-Alawi et al (2007), who examined the critical success factors of knowledge-sharing, increasing the level of participation in decision-making and reducing the boundaries between organisational levels can enable vertical information flow. Moreover, interviewees in their study highlight that hierarchal structures can hinder timely communication and decelerate knowledge-sharing, while a flat structure is best for knowledge-sharing.

Technology and innovation capital

According to Nonaka and Takeuchi's (1995) knowledge transformation model (see Appendix 4), organisational databases and data depositories can play a key role in the internalisation of new knowledge. Moreover, the use of internet telecommunications also facilitates the interactions of human and social capital; for example, a company's intranet platform can help facilitate knowledge-sharing (Chu and Chu 2011). The amalgamation of technology alongside human and social capital has long been overlooked in the literature. However, as we have illustrated, applications (apps) are now being used to measure employee psychological states, thereby aiding HC well-being (Barsade and O'Neill 2016). Moreover, apps are also facilitating e-learning and self-directed learning (Stephan et al 2016). In some industries, technology is vital to competitive advantage; for example, Toh (2014) finds that star inventors actually influence the adoption of certain technologies over others. The specificity of technology can also facilitate employee embeddedness (attitudes), if certain employees can only operate the equipment or the equipment is location-specific (Charlier et al 2016).

Conversely, in some industries, technology has taken control over everyday tasks. For example, Elliot and Long (2016) highlight a case where computer technology now handles most of the everyday activities at a supermarket distribution facility, demonstrating that the presence of such technology can also have implications for worker interaction and job roles. In summary, technology can facilitate HC and knowledge capital; however, management should also be aware that technology is also continuing to redefine both the workplace and job roles. Finally, in terms of innovation capital, it was shown earlier in the report how R&D activities can influence an employee/workforce absorptive capacity (Kor and Mahoney 2005). For instance, R&D-intensive firms are better able to absorb and apply new knowledge because they do it on a regular basis. Additionally, in terms of organisational patents, existing patents may facilitate the development of new patents and knowledge. Therefore, augmenting the existing organisational knowledge base can facilitate the development of HC (employee knowledge) and the creation of new patents (organisational knowledge) (Breitzman 2009).

Summary

The previous sections outlined the role of the KBV and IC in achieving competitive advantage. In terms of measuring organisational knowledge, the importance of examining the interactions between human, social and organisational capital (IC) was highlighted. Thus, a key point from this section is that firms need to be able to measure the interrelationships between these three types of capital, as the interactions between these constructs have important consequences for the development of both HC and knowledge capital within organisations. Also important is that HC can be measured at both the individual and firm level in order to align organisational capabilities with strategic objectives.

3 Measuring human capital: the theoretical perspective

The previous sections outlined the academic theories which surround HC management. In most cases, the relevant studies measured the impact and antecedents of HC on employee and firm performance. For example, Rich et al (2010) measure the impact of employee engagement on task performance and employee citizenship behaviour.

In much of the literature surrounding HC, persuasive arguments have been made that organisations should measure and analyse the impact of HC initiatives on firm performance. In increasingly competitive environments, managers now need to establish a more robust way of examining how the human function adds value. For example, Thomas et al (2013) have summarised several of the key questions surrounding HC measurement: what impact can training have on customer retention; does productivity rise with employee tenure; how do leadership development programmes enhance business performance: and, ultimately, what is the return on investment from specific HC initiatives?

In summary, there has been an increasing realisation in the literature of the importance of measuring and analysing HC data to enhance strategic decision-making (Thomas et al 2013). Not surprisingly, given the above observations, there has been a rise in interest amongst scholars in facilitating improved business outcomes by investing in better HC measurement and data analytic processes (Roslender and Stevenson 2009). However, it is clear that many organisations still lack adequate bespoke measurement systems, choosing instead to copy HC measurement systems from other organisations which may not necessarily fit with the focal firm's strategy (Thomas et al 2013). Moreover, other authors, such as Bassi and McMurrer (2007), have noted that many organisations still employ basic headcount metrics rather than linking HR or HC metrics to strategy which can measure the actual *impact* of HC initiatives on the organisation.

The concept of HC reporting is also attracting interest in the HC literature. As the importance of the knowledge economy increases, the value of intangible assets often supersedes that of physical assets. As this area evolves, many practitioners predict that HC metrics will increase in importance to the same level as financial performance metrics as key indicators of firm performance (Chen et al 2004, Thomas et al 2013). Indeed, as has been shown in several recent studies (McCracken et al 2016), the raised importance of HC reporting in annual company reports has already been underlined. Clearly, if HC reporting is managed correctly, it can increase the likelihood of investment and potentially attract new talent to the organisation (Gamerschlag and Moellor 2011, McCracken et al 2016). Furthermore, organisations with enhanced HC reporting may improve their corporate reputation by illustrating their commitment to employee-led corporate social responsibility (CSR) initiatives. Indeed, there are many benefits of HC reporting; however, research by Stern and James (2016) has also shown that there can also be a dark side to HC reporting, which will also be discussed later in the report.

The importance and value of human capital measurement

The process of measurement increases workplace knowledge and affords greater control and visualisation over organisational functions. This in turn enables management to make better strategic decisions (Thomas et al 2013). The same logic can be applied to HC management. For example, a manager measuring the impact of training initiatives on employee performance can identify skill gaps and thus areas for future improvement in terms of building employee capabilities (Thomas et al 2013, Molodchik et al 2014). Another example may involve measuring the impact of high-performance work systems on employee health and safety (Zacharatos et al 2005). In this sense, the measurement of HC is not only an important strategic issue; it can be an important social issue as well (that is, health and safety and human rights concerns) and therefore it is important to measure the performance of a firm's HC in areas such as CSR and sustainability (Bartlett et al 2006). Ultimately, as intangible assets are increasingly being recognised as the lifeblood of an organisation in this knowledge-driven era, it is important that effective metrics are developed which allow HC indicators to be reported to increase investment, attract talent and safeguard the firm's reputation as an equal opportunities employer (Chen et al 2004, Gamerschlag and Moellor 2011).

A comprehensive review by Scholz et al (2007) outlined five different approaches to HC measurement – the cost approach, the market value approach, the accounting approach, the value-added approach, and the human resource indicator approach. Each of these is now discussed.

The cost approach

The cost approach can trace its origins to the cost-of-production method of Engel (1883), who estimated the value of HC using child-rearing costs borne by parents. However, as Dagum and Slottje (2000) stress, this approach should not be construed as an estimation of individual HC, as it is merely a summation of historical costs which ignores the time value of money and the social costs that are invested in people. Under the cost-based approach, intangible investments are the costs associated with enhancing the quality or productivity of labour. These involve expenditures on items such as health and safety, mobility, education and training. However, as Le et al (2003, p1) highlight, *'there are several limitations with the method. First, as is well known when evaluating physical capital by costs, there is no necessary relationship between investment and the quality of output: the value of capital is determined by its demand, not by the cost of production. This problem is more serious when measuring HC and thus renders cross-sectional and temporal comparisons less robust.'*

The market value approach

Approaches which focus on the market value of the firm try to assess HC by drawing on the organisation's market value, book value and number of employees. The book value of the firm is compared with its market value in order to measure intangible assets. However, as Scholz et al (2007, p4) highlight, *'Early approximations like the difference between current market value and book value or the relation between market value and book value (for example, Stewart 1997, pp224–5) turned out to be too rough estimations.'* The contemporary iteration of this approach often sees researchers employ Tobin's Q to examine changes in market value as a proxy measure of HC or IC performance (Sveiby 2002, Tseng and Goo 2005). The problem with this approach, however, is that it cannot fully account for the internal processes and antecedents of HC. Moreover, changes in the market value of the

firm may be caused by other factors. Therefore, the market approach is best combined with other performance indicators.

The accounting approach

The accounting method measures the organisation's investment in employees according to five key parameters: recruiting, acquisition, formal training and familiarisation, informal training and informal familiarisation, and experience and development. This model suggests that instead of charging the costs to the income statement, it should be capitalised in the balance sheet (Hermanson 1963, Chen and Lin 2004). However, implementing such a model has proved difficult, as it requires standardisation of measurement practices among organisations and raises complex issues surrounding depreciation in the balance sheet (Scholz et al 2007).

The value-added approach

The value-added approach tries to link the value added by employees to HC. For example, this may involve measuring sales per employee (employee productivity) or profit per employee. However, a limitation of this approach is that the indicators are often linked to sales performance or profitability performance and hence lack a detailed picture of the impact of HC on different indicators. For example, how does HC impact innovation outputs rather than sales outputs. Moreover, a fluctuation in the sales market could skew sales-based HC accounting metrics (Scholz et al 2007). Therefore, market-based factors may distort these value-added metrics (Scholz et al 2007). Finally, accounting metrics such as revenue per employee are typically computed by dividing revenues by the total number of employees. However, as Bukowitz et al (2004, p45) highlight, *'while this approach may be useful from a firm level perspective, this approach does not reflect reality as not all employees make an equal contribution towards revenues.'* Nevertheless, such metrics are an important step forward in terms of HC measurement, and many value-added metrics are applied in organisations today in order to give insight into factors such as overall productivity.

The HR indicator approach

Approaches which focus on HR indicators attempt to specify the HR forces that are driving corporate success. This results in a number of key performance indicators and performance drivers, such as annual training hours or the degree of variable payment (for example, Becker et al 2001), which are able to leverage HRM efforts. HC management in this approach is seen as the description, combination and regulation of key performance indicators. This approach connects HC performance with the company value. If excellent HC management increases corporate performance, it should be possible to identify the directly induced influences on the corporate value (for example, Fitz-Enz, 2000).

Measurement and reporting: the contemporary theoretical perspective

Contemporary measurement theory is focused on firm performance and linking employee performance indicators and collective unit-level indicators (that is, workforce engagement) to both job- and firm-level outcomes, that is, the outcome approach (Coco et al 2011, Thomas et al 2013). The outcome approach involves the interpretation and analysis of data (HC analytics) as well as workplace planning and forecasting for future performance.

The multiple dimensions of value: measuring human, social and structural capital

A recent development in measurement theory is the acknowledgement that it is often not enough to measure HC in isolation (Subramaniam and Youndt 2005). As highlighted

previously organisations need to incorporate social and organisational capital into the equation, as HC relies on these constructs to create knowledge capital. Furthermore, social capital and organisational capital often facilitate the development of HC. As Subramaniam and Youndt (2005, p459) highlight: *'In today's network-based organisations and economy, it may be appropriate to move beyond traditional definitions of human capital that revolve primarily around educational/functional skills to include competencies surrounding interpersonal interactions and networking.'* Indeed, Subramaniam and Youndt (2005) found that human capital and social capital combine to aid radical innovation capabilities.

In terms of measuring human and social capital, Hollenbeck and Jamieson (2015) argue that firms can benefit from a social network approach. For instance, Hollenbeck and Jamieson (2015, p380) state: *'By asking employees questions (surveying) about who they go to for advice and expertise or who helps them generate new and novel ideas, it is possible to create knowledge network maps and quantify an employee's knowledge output, thus giving organisations a new and meaningful way to measure performance.'* It is also possible to measure how organisational resources such as databases, manuals or patents impact HC development. For example, Grigoriou and Rothaermel (2014) measure innovation output quality by measuring the number of patent citations. Alternatively, it may be possible that firms can also measure internal patent citations to get an indication of which organisational assets are facilitating new knowledge-creation and HC development. For instance, the analytical company 1790 Analytics has shown that papers appearing in IEEE journals, and papers presented at IEEE-sponsored conferences, are cited heavily by *later* patents (Breitzman 2009). Therefore, existing patents and research can also aid future human knowledge and innovation.

Another important element in terms of the social dimension and HC measurement relates to how the interactions between different organisational functions may influence organisational outcomes (Coco et al 2011). For example, new knowledge acquired by front-line employees (that is, marketing or sales) may increase the knowledge of employees in R&D or production. For example, sales employees may find that consumers are now demanding greener and environmentally sustainable products. This may require the firm's R&D function to act on this information and design products with sustainability in mind. This type of customer-facing strategy is particularly important in 'agile' or adaptive organisations, which operate in turbulent environments. Hence, management need to be able to measure cross-functional team collaborations and relations to ensure information can freely flow throughout the organisation. A good example of how such measures have been developed is noted in work by Politis (2003), who found that recording the number of meetings between cross-functional teams and measuring inter-organisational trust could be effective in understanding if knowledge channels are functioning correctly. Hence a comprehensive measurement system can provide an organisational blueprint for the knowledge processes at work within organisations.

The value of valid, comprehensive and coherent measurement

Corporate measurement systems are not only important for monitoring and control; a robust measurement system should also facilitate HC development and organisational learning (Batac and Carasuss 2009). This is because a measurement system can be a source of learning and knowledge in itself (Thomas et al 2013). However, Rompho and Siengthai (2012) emphasise that in order for a measurement system to enable organisational learning

and HC development, the system should be: (1) valid, (2) comprehensive and (3) coherent. In their study, Rompho and Siengthai (2012) examined the relationship between measurement system validity, comprehensiveness and coherence, and its relationship with organisational learning and HC development (employee competencies and worker satisfaction). See Figure 4.

Figure 4: Performance measurement system for HC-building (adapted from Rompho and Siengthai 2012)

H1. An effective PMS is positively related to firm HC building.

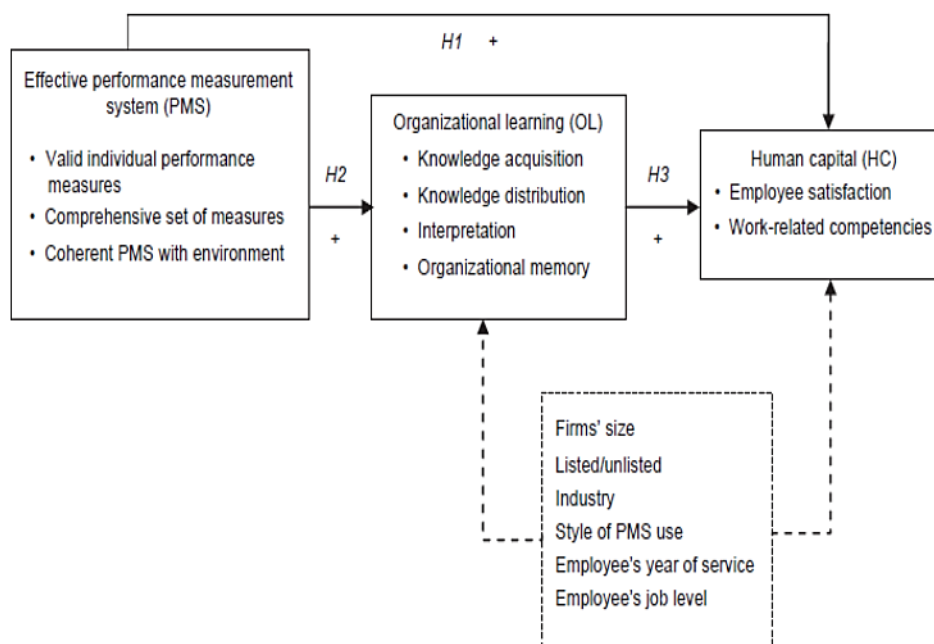


Figure 1.
The conceptual model illustrating the impact of the relationship of an effective performance measurement system and organizational learning on firm human capital

Measurement validity concerns the reliability (French 2002, Mondy and Noe 2008, Snell and Bohlander 2004) and sensitivity of the measurement system (Rompho and Siengthai 2012). Thus, validity reflects the performance appraisal instrument’s ability to measure what the organisation wants to measure in terms of employee performance. The technical validity of the performance measure is positively associated with the perception of organisational justice or fairness (Burney et al 2009), while sensitivity is the notion of the performance appraisal instrument’s ability to measure variability in employee performance accurately (Zikmund 1997).

Measurement comprehensiveness refers to both financial and non-financial measures of performance. Research shows that firms employing both types of measure achieve higher performance levels (Evans 2004). Moreover, Kaplan and Norton (1996a) suggest that a set of performance measures should include a mixture of performance outcomes and performance drivers to provide information about the direct causes of performance and how the outcome can be achieved. As noted above, measuring the interactions between human,

social and organisational capital can help organisations better map the knowledge processes within the organisation (Subramaniam and Youndt 2005).

Measurement coherence concerns the alignment of the measurement system with the organisation's goals. Sim and Koh (2001) find that manufacturing plants that have linkages between their strategic goals and their performance measurement system (PMS) perform better than those without such systems in place. Additionally, information from the PMS is used as feedback on employee performance. Thus, it is suggested that in order to influence employee behaviour to achieve the desired performance, the PMS should match the reward system and the firm's culture.

The results of the Rompho and Siengthai (2012) study found that the three measurement mechanisms, that is, validity, comprehensiveness and coherence, are each individually related to different organisational learning and HC outcomes. For example, the study found that a *valid* individual performance measure has a significant positive relationship with employee satisfaction. The authors reason that a *valid* individual performance measure provides both accurate and understandable feedback to employees, which in turn results in a positive perception or belief in the PMS, ultimately leading to a more satisfied worker (Robbins 2003). In this sense, a valid measure is also more likely to accentuate fairness or procedural justice, which in turn also has a positive impact on job satisfaction (Falk et al 2008, Rompho and Siengthai 2012, Seifert 2016).

The study also found that a comprehensive set of performance measurements is related to workplace competencies. Rompho and Siengthai (2012) argue that a comprehensive set of performance measures provides a holistic view of firm performance and also demonstrates performance using different dimensions, for example performance outcomes and drivers. The key activities that have direct effects on the desired outcome can be identified and more attention will be obtained from management. As business operations often require continuous improvement, managers or firms can better target the competencies which need to be developed to enhance employee and organisational performance outcomes. At the same time, simple processes of the system to acquire, analyse and distribute the information facilitate and encourage managers to use the information or reports produced. Such processes provide hard evidence to explain past performance; consequently, the skill level of individual employees and their performance can be tracked (Green 1999). This can support the improvement of employees' work-related competencies and the forecasting of future HC needs.

A third finding was that the coherence of a PMS system with its environment is positively linked with organisational learning. The logic behind this finding is that a coherent PMS links performance with strategy, thereby enhancing the learning environment by providing information that presents causal relationships. The information enables employees to detect problems and think about how to avoid undesirable outcomes. For instance, as the PMS should function as a database that employees can use to acquire knowledge and store for future use, it enables processes of knowledge acquisition and organisational memory. It is also used as a platform to share, analyse and distribute performance results from different organisational units (Nonaka and Takeuchi 1995). This enables the processes of information distribution and interpretation, which in turn facilitates organisational learning.

Finally, Rompho and Siengthai (2012) find that organisational learning has a positive relationship with HC (satisfaction and competencies). This is because an organisational learning climate provides both extrinsic and intrinsic factors that lead to job satisfaction or, as Rompho and Siengthai (2012, p501) describe, '*Employees have more opportunities to learn and improve themselves.*' For example, Eldor and Harpaz (2016) found that a learning climate facilitates employee engagement, which in turn leads to extra-role behaviours such as employees' proactivity, knowledge-sharing, creativity and adaptivity. Not surprisingly, the Rompho and Siengthai (2012) study also found that organisational learning mediates the relationship between PMSs and HC-building. For instance, Hatch and Dyer (2004) found that HC facilitated by organisational learning can lead to competitive advantage (outcome). Hence, the importance of a robust measurement system which facilitates learning is important both at the individual and unit levels.

In summary, this section sheds light on the benefits of PMSs besides that of monitoring and control. More specifically, this section outlined how a PMS can have a significant impact on the improvement of HC (employee satisfaction and work-related competencies) and organisational learning. Hence, a robust measurement system can be a powerful source of knowledge and competitive advantage in itself. The next section discusses HC analytics, which interpret and analyse the data created by the PMS in order to aid strategic decision-making.

The drive towards human capital analytics

The previous section outlined the value of having a robust HC measurement system. However, the data produced by the measurement systems is irrelevant if it cannot be interpreted, analysed and used to improve firm performance (Thomas et al 2013). For example, the philosophy of Six Sigma was introduced in the field of operations management so organisations could run statistical tests and analysis of operations data in order to reduce product defects (outcomes), make more informed operational decisions, and forecast future production bottlenecks based on predictive models (Basu 2012). Hence a similar approach to measurement and analysis is required in relation to HC.

HC analytics facilitate the interpretation, examination and application of HC metrics (Bersin et al 2016, Thomas et al 2013). HC data can be used not only to correlate the relationships between different workplace variables on business outcomes, but can also be used to forecast future outcomes, much like in the field of Six Sigma and operations management. A key advantage in developing HC analytics is that they enable organisations to measure in more detail relationships between key variables, which may impact employee and firm-level performance. For example, rather than merely recording employee engagement levels, organisations can correlate engagement with employee proactivity and knowledge-sharing in much more detail (see Eldor and Harpaz 2016). For example, the development of strategic tools such as HC dashboards and the balanced scorecard are proving useful in terms of HC analytics, as these tools can help link performance goals to outcomes (Kaplan and Norton 1996).

Ultimately, if HC analytics are captured effectively, they may prove useful in predicting future workplace trends. For example, by analysing employee safety feedback and engagement data, firms can potentially reduce workplace accident rates (Bersin et al 2016). In another interesting example, a US high-tech company developed an analytics model that accurately predicted job candidates who are likely to become 'toxic employees' (those who lie, cheat or

commit crimes) and dramatically reduced this population among its workforce by scrutinising special parts of the interview process (Bersin et al 2016). Finally, software companies, retail banks and manufacturers are analysing the characteristics of top salespeople, realising that their personal networks (social network theory), how they work internally, and the time they spend with customers produces far more accurate results than the amount of sales training or experience (Hollenbeck and Jamieson 2015, Bersin et al 2016).

Hence, the developments in data management and people analytics are helping organisations take strategic decision-making to the next level. The next section of report discusses HC reporting, which relies on data from HC metrics and analytics to enhance firm value.

Human capital reporting theory: reporting human capital value

As interest in understanding the value of intangible HC assets continues to rise, organisations are beginning to understand that there is value in publicly disclosing HC *metrics* and HC information. In an era of corporate transparency, firms are utilising annual company reports to communicate HC strategies and issues to stakeholders (Gamerschlag 2013).

There is also increasing academic interest in linking HC reporting to increased organisational value. For example, using content analysis and data valuation models (equity metrics), Gamerschlag (2013) finds that HC information is value-relevant to the stock market. More specifically, Gamerschlag finds that, in particular, information disclosures on HC qualification and competence issues (that is, training, education, expertise, know-how and organisational learning) are related to increases in share price in the mid to long term. Overall, the study finds a positive association between HC reporting and value-creation. These findings are in line with recent studies' results, which also identified an overall positive relationship between voluntary disclosures and firm value (for example Abdolmohammadi 2005, Anam et al 2011, Vafei et al 2011, Uyar and Kilic 2012).

To further reinforce these conclusions, a study by Lin et al (2012) found that HC disclosures in the firm's annual reports positively impact on organisational performance, such as *market-to-book ratio* and *ROA*. Moreover, the authors found that organisational size negatively moderates the relationship between disclosure of HC information and firm performance, while knowledge intensity (employees with a college degree or above) has a curvilinear positive moderation effect between the relationships outlined above. Therefore, it is believed that firms engaging in knowledge-based competition can achieve better performance by disclosing HC information.

Another area of interest in terms of HC reporting relates to employee-led CSR disclosures. A study by Pedrini (2007) concludes that firms may find value opportunities by integrating IC and corporate responsibility reporting in their annual reports, which could be useful in terms of outlining the sustainability practices of their HC. This could lead to enhancements in corporate reputation, which in turn lead to financial and market-based benefits. More recently this area has been studied by various authors with mixed results. For example, Dhaliwal et al (2011) linked CSR disclosures to a reduction in the cost of equity capital, yet Aras et al (2010) could not find any significant link between CSR disclosures and financial performance. However, regardless of such contrasting results, other authors have noted that several potential benefits may be attained if organisations engage in effective HC reporting.

For instance, Chang et al (2012) have noted that if information is published on factors such as work flexibility, mentoring programmes and development opportunities, talented potential recruits may be attracted to the organisations.

Ultimately, the issue of HC reporting is still an area where there is some controversy, with several authors, such as Stern and James (2016), revealing a dark side to HC reporting in terms of executive turnover. In their study, Stern and James found that when publicly traded firms voluntarily and publicly disclosed positive information about their value-creation and appropriation activities (R&D activities), they also sent positive signals to managerial labour markets regarding executives' capabilities. Hence Stern and James (2016) propose a positive association between public disclosures and voluntary executive turnover. Indeed, the analysis of pharmaceutical and communications equipment firms from 1990 to 2004 supports this prediction, underscoring the need to understand better the effects of voluntary public disclosures on a firm's ability to protect its HC. Therefore, Stern and James (2016) argue that some organisations are using HC disclosures to identify and poach an organisation's key talent. Hence this new research suggests organisations will need to carefully scrutinise the type of data they are disclosing.

Conclusions

This report takes a theoretical perspective on the management and measurement of HC within organisations. More specifically, the literature review examines the academic theories surrounding HC at both the employee and firm level.

First, the resource-based view (RBV) and capability perspectives (CAP) underline the need for the growing focus on HC in the firm performance and competitive advantage debate. For example, it is shown that HC is not only important to individual-level outcomes such as job performance and employee development, but also firm-level outcomes such as capability development and competitive advantage. Hence, the measurement of HC now becomes an issue of critical importance for management. The review also highlights that management can take a strategic approach regarding the type of HC metrics and analytics employed within organisations. Moreover, this alignment between HC and strategy may lead to more desired organisational outcomes. For example, a 'lean' organisation may favour data relating to employee working efficiency. In this sense, HC metrics relating to issues such as employee productivity and on-the-job training become crucial.

Second, from a knowledge-based perspective (KBV), the review highlights that it is important for management to understand the interactions between human, social and structural capital. Social capital in particular is shown to be the bond which ties all other forms of capital together and plays a key role in both employee creativity and firm-level innovation. Hence, it is vitally important management is able to measure social capital alongside human and structural capital in order to identify any barriers which may impede socialisation on the job. In this sense, the organisational climate and structure becomes a key facilitator of both human and social capital development.

Third, from a change management perspective, the review highlights that HC can be leveraged in times of uncertainty and strategic change. The theory of dynamic capabilities (DCT) underlines the importance of employee adaption and agility and being able to respond to changing customer and industry demands. For example, an 'agile' organisation may favour data relating to employee and workplace flexibility. In this sense, HC metrics relating to issues such as job rotations and skill diversity become important.

Finally, in light of the above observations, it is vitally important that organisations have a robust HC measurement and reporting function so management are supplied with the data to make more-effective decisions and predictions regarding HC management and development within the organisation.

Recommendations

After undertaking a comprehensive literature review, this section makes recommendations for future research based on gaps in the academic literature. Although a wide range of concepts and theories relating to HC are discussed throughout the review, there are gaps in the literature which provide opportunities for future research.

First, the idea of HC emergence is discussed in the review, that is, how individual-level KSAOs form unit-level resources (Ployhart and Moliterno 2011). As HC is increasingly linked to strategic outcomes, it is imperative that future research is able to investigate the link between individual-level HC and firm-level capabilities. More specifically, research is needed linking HC at the individual level to firm-level strategies. For example, how does job rotation impact operating flexibility? How does employee creativity/innovation impact sustainability performance? Also important is the issue of measurement. For example, what human metrics are employed within lean organisations, agile organisations, innovative organisations and sustainability-focused organisations? Although the literature review touches on this issue, there is a greater need for research which links HC metrics to strategic outcomes. This is of critical importance in terms of both improving organisational performance and benchmarking performance against other organisations. Hence, future research could possibly examine company annual reports, and other publicly available material, to examine which firms are employing lean operating strategies, service strategies, or innovation strategies in order to identify the utilisation of HC metrics. Finally, one important observation is that a great deal of research surrounding HC tends to be survey based and therefore can offer only a cross-sectional view of firm performance (Wang et al 2012). Future research studies could take a more longitudinal perspective and examine how HC initiatives can impact organisational performance over time.

A second area of future research involves examining the reverse relationship, that is, how unit-level resources impact HC development, for example, how contextual organisational resources enable HC development within organisations (Crocker and Eckardt 2014). For example, it was shown in the literature review that an organisational climate of diversity is linked to improved employee performance (Armstrong 2011). Eldor and Harpaz (2016) also demonstrated that a learning climate is linked to employee engagement, which in turn facilitates extra-role behaviours such as knowledge-sharing. Crucially, Eldor and Harpaz (2016, p229) conclude in their recommendations for future research section that *'future studies can improve our approach by including other elements such as ethical climates, accountability, transparency, and organisational politics instead of focusing on just the learning climate.'* Finally, from an organisational design/structure perspective, Han et al (2014) show that teams assembled with individuals from a variety of different knowledge backgrounds can facilitate the development of social capital and employee creativity.

Despite the aforementioned studies, research has only started to examine the interactions between human, social and structural capital (Campbell et al 2012b, Han et al 2014). More research is needed in this area (Subramaniam and Youndt 2005, Campbell et al 2012b). For example, how does technology (structural capital) enable human and social capital? The technology aspect in particular appears to be an overlooked area of research in the literature (Aral and Weill 2007, Khatri 2010). For example, is e-learning technology aiding employees in their development, or is technology actually replacing employees in certain industries?

Furthermore, how is technology aiding HC measurement? Are apps useful in measuring aspects of employees' day-to-day routines? Hence, there are opportunities for future research in terms of both managing and measuring the interactions between human, social and structural capital.

A third gap in the literature concerns the use of teams as enablers of human and social capital in the pursuit of organisational outcomes. The gap in the literature relates to the observation that much of the academic literature on HC refers to the individual rather than groups or teams. However, team structures are now seeing increased use in many knowledge organisations (Han et al 2014). Despite this observation, research in the area of teams is limited. Exceptions are studies by Kor and Leblebici (2005), Campbell et al (2012b) and Han et al (2014). More specifically, the literature would benefit more from research relating to different types of teams, that is, cross-functional teams, self-directed teams, top management teams, and how these team structures contribute to unit-level capabilities and corporate strategy. Empirical research in the area of self-directed teams in particular is limited (Park 2012). Leadership in teams is also important; for example, Han et al (2014) recommend employing team leadership as a control variable in future studies relating to team creativity. Finally, more research is needed in the areas of cultural diversity and equality in the make-up of teams.

A fourth area of research relates to job design. It is noted in the review that a possible solution to reduce employee turnover may be to afford employees more flexibility in their jobs. As Generation Y has now entered the workforce in greater numbers, it is imperative that employers can offer job packages and working environments which suit these individuals' needs. This may mean greater work-life balance or greater flexibility in job roles (Bersin et al 2016). For example, job-crafting may be a powerful employee retention tool for key employees who are unhappy in their jobs. Job-crafting involves individuals who alter their jobs to better suit their skills. In this sense, job-crafting can also be a powerful employee engagement and retention tool (Wrzesniewski et al 2010). However, research on job-crafting is limited and is only recently receiving renewed attention in the literature after decades of neglect.

A fifth area of research involves examining the role of HC in organisational change and adaption. This is because of the observation that a strategically aligned workforce can be a powerful tool in coping with environmental changes and rapidly changing customer demands (Lee 2004, Rigby et al 2016). Early research by Schultz (1961) and Nelson and Phelps (1966) argued that HC could be leveraged to better cope with changing environments. Contemporary research on this issue is limited (Wang et al 2012). However, as shown in the literature review, contemporary theories such as that of dynamic capabilities have a good fit with this perspective. Nevertheless, research which links HC to dynamic capabilities and organisational change is scarce, hence this area represents a key area for future research. Research could examine how HC can be leveraged in responding to changing environments. In this sense, issues such as absorptive capacity, skill flexibility, job-crafting, employee innovation and leadership all take on an important role in this perspective (Petrou et al 2016, Wang et al 2012). Also important is examining the process by which firms change, that is, how employee layoffs are managed in the case of downsizing, or how job roles transform to respond to changing customer demands. In this sense, a longitudinal perspective of HC management may be helpful (Wang et al 2012).

Other important areas for research include employee health and well-being. Roslender et al (2012) argues that well-being should be considered as a form of IC, as a healthy workforce can operate at optimal levels, that is, reduced sick absences and so on. In this sense, future studies could examine how employee well-being links to firm performance. Finally, although not discussed in detail in this report, future research could examine the role of the stakeholder perspective in HC reporting. Given the rise of integrated reporting, it would be interesting to see what HC metrics firms are employing to appeal to stakeholders (Cuganesan 2006).

Appendix 1: Research methodology

The literature review framework utilised in this study is based on the work of Torgerson (2003) and his model for conducting a systematic literature review, as outlined below. As the HC report is intended as a reference to inform the development of future research and the HR community, the Torgerson approach has a good degree of fit with the research questions and the research outputs of this study. According to Torgerson (2003, pp7–8), a systematic review aims to:

- address a specific, focused and relevant research question
- search for, locate and collate the results of the search in a systematic way
- critique the quality of existing research in light of the research question
- synthesise the results of the review in an explicit way
- identify gaps in existing knowledge
- propose future research
- present the review in the final report to enable critical appraisal and reproduction by fellow researchers.

The researchers therefore used Ulster University's wide array of databases to search for both academic and practitioner articles and reports that were relevant to the research. This involved using search words and terms such as 'human capital', 'intellectual capital' and 'social capital' as well as the main theories identified in the research proposal. As the intention was to have as broad a review as possible, the researchers did not disregard articles from what may be termed lower-ranked journals, but ensured that a wide range of academic sources were used.

Appendix 2: Useful figures

Figure A1: A distinction between human capital resources and strategic human capital resources (Ployhart et al 2014)

A Multilevel Structure-Function Framework of Human Capital Resources

Level	Function (Unit Relevance)	
	Competitive Parity “Pursuit of Best Practices”	Competitive Advantage “Pursuit of Differentiation”
Unit	<p>Human Capital Resources <i>Unit capacities based on individual KSAs that are accessible for unit-relevant performance.</i> [Strategic Human Resources, Groups and Teams, e.g., Crook, Todd, Combs, Woehr, & Ketchen, 2011; Ployhart, Van Iddekinge, & MacKenzie, 2011]</p>	<p>Strategic Human Capital Resources <i>Unit capacities based on individual KSAs that are accessible for unit-relevant competitive advantage.</i> [Human Capital in Strategy/RBT, Top Management Teams, e.g., Kor & Leblebici, 2005; Carpenter, Geletkanycz, & Sanders, 2004]</p>
Individual	<p>Human Capital Resources <i>Individual capacities based on the person’s KSAs that are accessible for unit-relevant performance.</i> [Personnel Selection, Training, CEO, e.g., Nyberg, Fulmer, Gerhart, & Carpenter, 2010]</p>	<p>Strategic Human Capital Resources <i>Individual capacities based on the person’s KSAs that are accessible for unit-relevant competitive advantage.</i> [Stars/Professional Service Partners, e.g., Hitt, Biermant, Shimizu, & Kochhar, 2001]</p>

Figure A2: The benefits of mentoring (Allen and Eby 2007, Klinge 2015)

Table 1. A Model of the Consequences of Mentoring in a Learning Organization.

Mentor benefits	Mentee or protégé benefits	Organization benefits and outcomes
Learning partner	Knowledge	Improved job performance
Knowledge	Skill enhancement	Productivity
Skill enhancement	Supportive feedback	Cost-effectiveness
Cognitive rejuvenation	Assimilation into the culture	Improved recruitment
Feedback	Sense of cohesion, responsibility, and integrity	Talent pool development
Expanded awareness of environment	Awareness of political environment	Career and life planning
Creativity	Sense of power and confidence	Career satisfaction
Sense of purpose and fulfillment	Creativity	Increased organizational communication and understanding
	Leadership development	Increased trust
	Higher earnings	Maintaining motivation
	Personal values clarification	Improved strategic planning
	Professional values clarification	Creativity
	Advancement of underrepresented groups	Employee enthusiasm
	Increased job satisfaction	Collaboration
	Greater influence in the organization	

Figure A3: The 'Niko Niko app' (Barsade and O' Neill 2016)

TRACKING EMOTIONS

Companies have started using apps like Niko Niko to help individual employees and teams log their emotional reactions to various activities and make the connection between their moods and productivity.



The knowledge transformation spiral (Nonaka and Takeuchi 1995) – working example

One day while working on the production line, an employee comes up with the idea for redesigning a product's packaging so fewer materials are used. This occurred when they spoke with an external transit-handler, who complained about the weight of each product and the number of runs to and from the company. The employee absorbs this new knowledge and notices that the firm uses excess packaging and that the product could be safely packed without this. Hence, they set about redesigning the packaging and find that their theory is correct. This idea is valuable to the organisation as it reduces costs, is environmentally sustainable and also means the firm can ship more products at once. This knowledge interaction process is referred to as *socialisation* (tacit to tacit), that is, knowledge which is transferred because of direct interactions between internal employees and supervisors or external customers/suppliers. In this case, the employee developed the idea after speaking with the firm's transit-handler. Hence, socialisation involves capturing knowledge by having direct interaction with people inside and outside the organisation, depends on having shared experience and results in acquired skills and common mental models. It is primarily a process between individuals and could involve face-to-face meetings, instant communication, emails, any groupware apps such as chat and collaboration tools, and also social networking (Nonaka and Takeuchi 1995).

The problem for the organisation, however, is that the idea for the packaging redesign still exists in one employee's head. At this point, provided there are no barriers to knowledge-sharing, the employee sets about articulating this knowledge and transforming it into explicit knowledge so they can communicate their new ideas to fellow team members and receive feedback. The process for making tacit knowledge explicit is *externalisation*, which helps to create new knowledge within the organisation as tacit knowledge emerges from its boundary and becomes collective group knowledge. During this process it can be said that knowledge is crystallised. The process of externalisation is often driven by metaphor and analogy models, for example ideas or images in words, metaphors and analogies. Hence, dialogue and knowledge-sharing play an important role in this stage. During such face-to-face communication people share beliefs and learn how to better articulate their thinking, through instantaneous feedback and the simultaneous exchange of ideas.

Once the employee's team members understand the idea, they set about standardising this knowledge by developing blueprints for the idea and documenting the process in operating manuals or workbooks. Once knowledge is explicit, it can be transferred through a process Nonaka (1995) calls *combination* (explicit to explicit). In this scenario IT is highly useful, because explicit knowledge can be conveyed in documents, emails, databases, as well as through meetings and briefings. The key steps are collecting relevant internal and external knowledge, dissemination and editing/processing to make it more usable. Combination allows knowledge transfer among groups across organisations. At this point, the employee's original idea for the packaging redesign is dispersed throughout the organisation (using the intranet or databases), with the aim of applying the same process to other product lines.

Employees working on different product lines in the factory subsequently observe and absorb this new explicit knowledge and apply it to their own product lines. Nonaka (1995) argues that the process by which explicit knowledge is converted to tacit knowledge is called *internalisation*, which is the process of understanding and absorbing explicit knowledge into tacit knowledge held by the individual. Internalisation is largely experiential and the concepts

and methods are actualised either through the actual doing or through simulations. The internalisation process transfers organisation and group explicit knowledge to the individual. One method by which an organisation may internalise explicit knowledge is to set up a knowledge repository (structural capital) that has data mining features, which allows the end user to navigate and search desired and relevant information. Thus everyone in the organisation can access the information which is on the firm intranet or repositories.

This example provides an illustration of Nonaka and Takeuchi's (1995) knowledge-creation model. The outcome of the employee's new packaging redesign was the development of new organisational knowledge routines (Grant 1996a), which allowed the company to reduce costs and improve performance. However, the new environmentally sustainable packaging also differentiated the firm from its rivals by allowing it to position itself as an environmentally sustainable player. The example also highlights two important facilitators of knowledge-creation and transformation, namely, HC and social capital. More specifically, the knowledge spiral model underlines the importance of the interaction of human and social capital. In the case of HC, the employee's absorptive capacity was crucial for the assimilation and development of new knowledge, while social capital was shown to be the vehicle by which tacit knowledge was distributed throughout the organisation. The employee was able to incorporate the knowledge they had learned from the transportation-handler and apply it to their work (that is, the packaging redesign). Therefore, the employee utilised their absorptive capacity to solve an organisational quandary. In this regard, their previous on-the-job experience combined with their problem-solving skills and interaction with other individuals were key elements in the employee assimilating and applying new knowledge.

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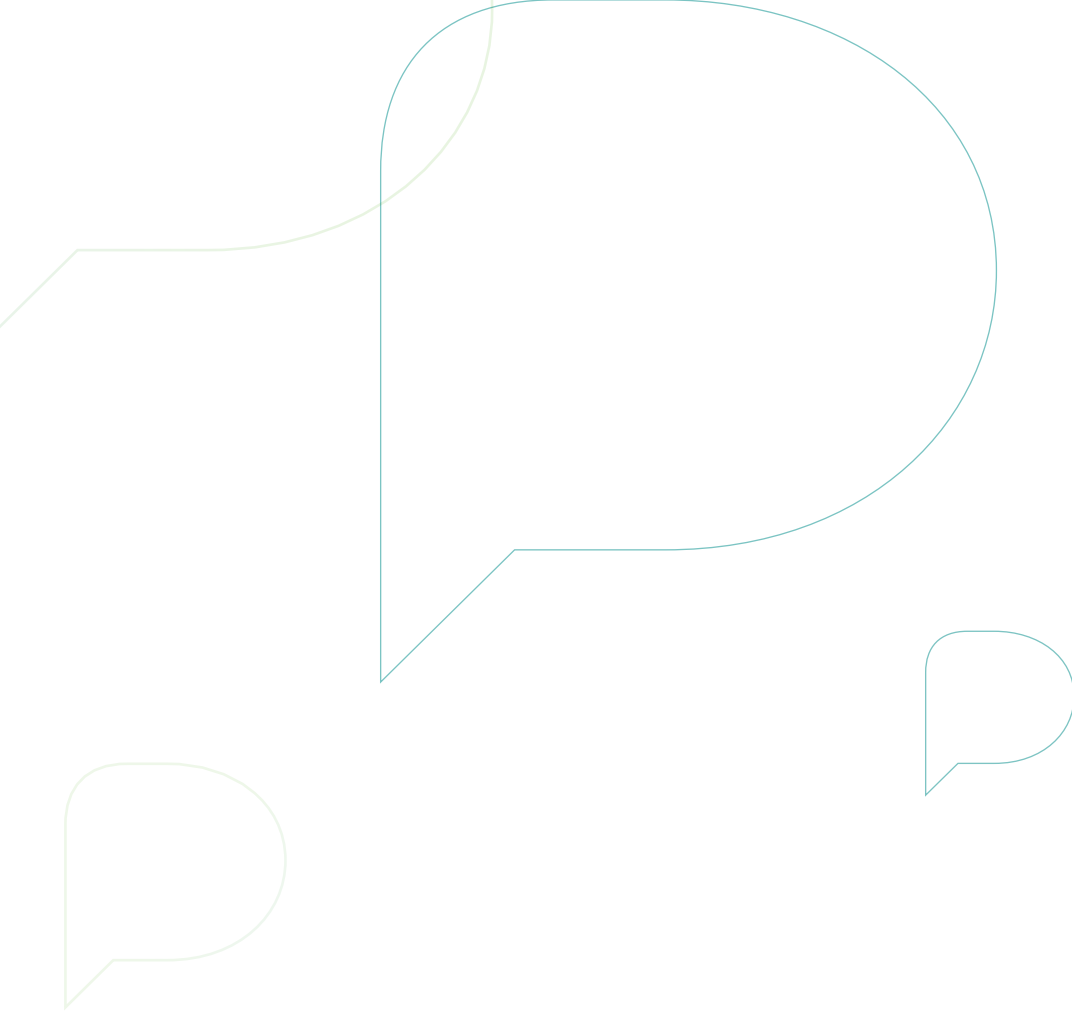
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