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A reflection and integration of workforce conceptualisations and measurements for competitive advantage

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ABSTRACT Workforce management is important in organisational performance. However, executives lament that their workforce management efforts remain ineffective. This comes as no surprise, as workforce measurement poses a challenge for several reasons: the many different conceptualisations of the workforce, which developed in parallel, and flawed workforce analytics, hence inadequate workforce intelligence, are among the most significant. To have the right people available requires timely and accurate information and intelligence to make evidence-based decisions. In order to achieve this proper measurement is required, which forms part of the information system that ensures the availability of the right people, at the right place, at the right time. People measurement/metrics, is a neglected area of research, which is receiving increased attention. Though little, if any, attention is devoted to the link between people as dimension of competitive advantage and metrics to ensure the availability of the right people, at the right place at the right time. Our conceptual paper attends to this omission by reflecting on the different conceptualisations of 'workforce' by integrating the diverse and fragmented literature, which has not been done before, and linking it with workforce measurement. In so doing, we provide a more comprehensive understanding of 'workforce' and workforce measurement, ensuring alignment with organisational strategy to secure a competitive advantage and, thus, organisational performance. We also propose an integrated framework to measure and manage the workforce. It transpired that of the many tools available, predictive analytics emerged as the most effective means to measure and manage the workforce successfully. Our paper benefits both academics and practitioners as theoretical ambiguities and tensions are clarified while ensuring the availability of the requisite workforce.

KEYWORDS competitive advantage, organisational performance, predictive analytics, strategy, workforce, workforce analytics, workforce intelligence, workforce metrics

1. INTRODUCTION

Workforce management, in whatever guise it appears, has emerged as the answer to promote competitive advantage, ensuring sustainable organisational performance (Owen 1813; LePak and Snell 2002; Sirmon et al. 2011; Campbell et al. 2012; Vaiman et al. 2012; Ployhart et al. 2014; Teece 2014; Wright et al. 2014; Collings 2015). In brief, workforce management is generally seen to involve utilising people with the right sets of competence, across occupations and hierarchies, in a particular context, to ensure organisational performance (i.e. goal achievement) both now and in the future. These sets of competence comprise knowledge (tacit and/or explicit; declarative and/or procedural), skills, abilities/capabilities, experience, attitudes/motivations and physical and emotional health. Although organisations recognise the importance of workforce management in sustaining organisational performance, their efforts remain ineffective (Ashton and Morton 2005; Lawler 2006; Beechler and Woodward 2009; Harris et al. 2010, 2011; Vaiman et al. 2012; Boudreau 2013; Dries 2013a,b; Winkler et al. 2013; Bersin et al. 2014; Gelens et al. 2014; Kinley and Ben-Hur 2014; Phillips and Phillips 2014; Collings 2015). A range of reasons is advanced for this state of affairs. On the one hand, it is argued that 'workforce,' especially in the talent guise, and 'organisational performance' lack conceptual clarity, influencing their measurement and consequently their management. This creates a dilemma for organisations when employing and deploying workers to ensure the organisation's performance. It stands to reason that we can only manage what we can measure, and we can do so only as well as the intelligence derived from the measurement. In addition, workforce management is compounded by challenges such as globalisation, skills shortages and the accompanying war for 'talent,' the mobility of workers, changing demographics and the recessionary lay-off of workers, all of which adversely affect access to workers and, thus, organisational performance (Axelrod et al. 2001; LePak and Snell 2002; Ashton and Morton 2005; Beechler and Woodward 2009; Farndale et al. 2010; Ployhart et al. 2011, 2014; Schuler et al. 2011; Sirmon et al. 2011; Vaiman et al. 2012; Thunnissen et al. 2013; Collings 2014, 2015; Teece 2014; Gallardo-Gallardo and Thunnissen 2016). On the other hand, it is argued that organisations do not use workforce analytics to derive intelligence based on proven measurement tools. This affects effective decision-making to ensure the availability of the required workforce when needed. Put differently, organisations generally do not use formal, relevant, business-focused metrics and intelligence to measure the impact of their workforce on goal achievement (i.e. organisational performance). And this is the case, despite the accessibility and demonstrated success of some measurement methods and tools (Bersin et al. 2014; Boudreau 2010, 2013; Collings 2015; Harris et al. 2010; Harris et al. 2011; Kinley and Ben-Hur 2014; Lawler 2006; Phillips and Phillips 2014; Vaiman et al. 2012; Winkler et al. 2013; Zula and Chermack 2007). It stands to reason that decisions regarding the workforce and their consequent impact on organisational performance are only as good as the intelligence/analytics yielded by the metrics used. We define 'analytics' as the information/intelligence that results from the systematic analysis of the data or statistics collected by the instrument(s) chosen to measure a specific workforce aspect to be managed.

To capitalise on the promise of workforce management, researchers call for further research (Boudreau 2013; Collings 2015; Dries 2013a; Gelens et al. 2014; LePak and Snell 2002; Vaiman et al. 2012) towards a finer-grained examination (Ployhart et al. 2011) of unresolved issues in the literature (Wright et al. 2014), while drawing on and (better) integrating various related literatures (Thunnissen et al. 2013; Vaiman et al. 2012) to more fully understand (Collings 2015; Thunnissen et al. 2013) and making a lasting contribution to workforce management and measurement (Thunissen et al. 2013; Vaiman et al. 2012) theory and practice.

This paper aims to respond to the above calls and contributes to the debate on this important issue by integrating significant sources from the diverse and large body of management literature on the different workforce guises, specifically (strategic) human capital (resources), talent management; strategic human resource (HR) management; strategy, particularly the resource-based view; engagement; and metrics, while providing top metrics that are used to make informed workforce decisions supporting strategy implementation, competitive advantage and, thus, sustainable organisational performance. The workforce literature centres on people in the organisation and their (collective) contribution to sustainable organisational performance. Although progress has been made in this regard (Vaiman and Collings 2013) there is still room for improvement (Boudreau 2013; Davenport et al. 2010, Dries 2013a, Vaiman et al. 2012) because of the incomplete representation, which limits organisational performance. The need to integrate these literatures stems from both theory and practice. The theory indicates ambiguities and tensions (Collings 2014, 2015; Dries 2013a,b; Thunissen et al. 2013; Vaiman et al. 2012), while practice indicates that the required workforce is not available when needed, jeopardising the strategy implementation and, consequently, competitive advantage and, ultimately, the sustainable organisational performance (Bersin et al. 2014; Collings 2015; Vaiman et al. 2012). A better integration of views across the literature in explaining phenomena is not uncommon and can, in certain cases, even be desirable (Mayer and Sparrowe 2013) as it will produce a more holistic understanding of workforce measurement and management, benefitting the practical application of the phenomenon and, ultimately, the competitiveness and sustainability of organisations. Thus our paper contributes to the body of knowledge, as it makes a synthesis that has not been made before and thus adds to knowledge (about workforce management and measurement) to support successful strategy execution, and thus organisational performance, in a way that has not previously been done (see Phillips and Pugh 2015, p. 26). Hence, our theoretical paper provides an overview of how to approach this topic strategically, culminating in a framework. The article begins by discussing people and their role in organisational performance. This is followed by a discussion of workforce analytics that can be used to ensure that organisations make sound decisions for unlocking the availability of the right 'workforce' when needed. The article concludes with a framework showing how metrics can be used to measure – and hence manage – the workforce to ensure organisational performance.

2. METHOD

The basis of this reflection was 86 texts, including peer-reviewed, full-text articles available in English, reporting on people contributing to organisational performance, whether conceptual or empirical in nature, and/or in combination with workforce metrics. These articles were gathered by merging our personal collections of texts on these topics with texts retrieved from a literature search from the Web of Science and EbscoHost limited to the period from 2000 – the year in which the first articles on the 'war for talent' appeared – to 2016. Search terms used were '(strategic) human capital (resources)'; 'strategic HR management'; 'talent management'; 'engagement'; 'strategic management'; and 'metrics, intelligence and analytics'. Only 17 of these texts specifically addressed workforce measurement in organisational performance, and only to a limited extent (see references).

3. PEOPLE AND THEIR ROLE IN ORGANISATIONS

The role of people in sustainable organisational performance has been recognised since the early management publications (see Owen 1813). People are acknowledged as the most valuable resource of organisations (Lewis and Heckman 2006) because of their potential to (collectively) drive organisational performance (Crook et al. 2011; Lockwood 2007; Ployhart and Moliterno 2011). Limited empirical evidence in this regard is available (Collings 2015; Guest 2011). Thus, people have been studied for a number of years from a variety of viewpoints, including (strategic) human capital (resources) (Becker 1962; Campbell et al. 2012; Ployhart et al. 2011; Ployhart et al. 2014; Wright et al. 2014), strategic HR management (Huselid 1995; LePak and Snell 2002), talent management (Collings 2015; Thunnissen et al. 2013; Vaiman et al. 2012), engagement (Cheese et al. 2008; Crook et al. 2011; Kahn 1990; Macey and Schneider 2008; Saks 2006) and strategic management (Barney 1991; Sirmon et al. 2011; Teece 2014). In short, these studies have explicitly or implicitly examined the availability of people with the required competence to execute organisational strategy successfully from an HR perspective or, to a limited extent, in combination with (business) strategy. These studies were largely developed in parallel and do not incorporate engagement and/or workforce measurement to enable management to make evidenced-based decisions on the availability of people with the required competence in support of its strategy execution.

Organisational performance stems from the competence people bring to the organisation, which should be aligned with the (common) purpose and goals of the organisation to support successful strategy implementation (Boxall 2013; Campbell et al. 2012; Collings 2014; Ployhart et al. 2011; Ployhart et al. 2014; Thunnissen et al. 2013; Wright et al. 2014). It should be noted that competence is not fixed or static and may change owing to changes in the workplace and/or environment (Bartlett and Ghoshal 2002; Campbell et al. 2012; Collings 2015; Lewis 2011; Lockwood 2007). It can therefore affect successful strategy implementation and, consequently, goal achievement, otherwise known as organisational performance. Moreover, competence by itself does not achieve organisational goals. The worker embodying the competence must be ‘available’ to dispense the competence in pursuit of organisational goals (Wright and McMahan 2011). Availability depends on both the worker and the employer (see Blumberg and Pringle 1982; Boxall 2013) and needs elaboration as it entails more than the mere physical presence of the essential number of persons embodying the requisite competence.

Availability also means that the employee must be able and willing to expend the embodied competence in pursuit of organisational goals. This ability and willingness to act depends on a host of factors, including whether the person has the physical and mental health and the opportunity to dispense his/her competence. We interpret the drivers of engagement identified by Cheese et al. (2008) as the availability of people to act in pursuit of organisational goals, which we will briefly elaborate on. Opportunity may include being deployed in the correct position, which includes the physical, cognitive and emotional demands that the job makes on the worker, the sense of achievement that the job offers, the opportunity to learn or discover new things, and whether it is meaningful and leads to some form of satisfaction. Opportunity is furthermore influenced by whether the worker has been given the means to handle the job and whether his/her goals are achievable. Handling the job involves knowledge, skills, technology, accurate and timely available information, systems, processes, training, a favourable working environment, supportive managers and colleagues, work practices that reduce effort rather than adding to it, reasonable workloads and health. Furthermore, the worker must perceive that he/she is receiving fair financial compensation and is recognised for his/her contribution to organisational performance. In the main, being fairly compensated is a feeling of being equitably rewarded for his/her contribution and understanding how this is evaluated; he/she must thus experience the process as fair. Compensation that is reasonably market-related signals recognition. Moreover, the worker must experience a sense of community, that is, there should be a feeling of positive social interactions in the workplace. The work should be perceived as fulfilling, meaningful, enjoyable, fun and done in a supportive or collaborative environment, rather than a confrontational environment. In addition, the employee must perceive congruence, which consists of agreement between the individual and organisational values and alignment of expectations and values that have been met. Workers must also perceive an alignment between their career and life expectations and aspirations over both the short and the long term, including work–life balance. They must also perceive whether the organisation is investing in them and whether they can shape their own destiny. Based on these drivers of engagement, workers then choose to engage themselves (more or less) in pursuit of organisational goals via strategy implementation. The level of worker engagement is, in turn, influenced by, inter alia, the conceptualisation of the workforce, which is the key to strategy implementation.

4. WORKFORCE AND STRATEGY IMPLEMENTATION

Strategy is a ‘potentially powerful tool to cope with change, but a somewhat elusive concept’ (Ansoff and McDonnell 1990). Simply put, strategy is the tool management uses to achieve organisational goals and, in so doing, secure organisational performance (Andrews 1987; Ansoff 1988; Drucker 1954; Grant 2016; Nilsson and Ellström 2012; Ployhart et al. 2014; Porter 1985, 1998). It is common practice to express goal achievement in financial terms (Drucker 1954; Nag et al. 2007; Nilsson and Ellström 2012), the ultimate litmus test for long-term sustainability. This, however, may deflect attention from non-financial measures, whether employee, customer or social good (Andrews 1987; Boxall and Purcell 2011; Collings 2014). This observation resonates with the purpose of an organisation, namely to deliver products/services that are valued by its customers, provide employment and contribute to wealth creation (Drucker 1954; Teece 2014). Wealth creation is a broader concept than profit maximisation, involving more stakeholders than only shareholders. Moreover, profit maximisation does not necessarily equate with efficacy and, on its own, is not sufficient for organisational sustainability (Teece 2014). Additionally, there is more to employment than meets the eye. Because workers are not inanimate resources, they think about their work and how they contribute to goal achievement (Griseri 2013; Rothbard 2001; Wright and McMahan 2011). Thus, workers are not merely vessels embodying competence, but actively assess (cognitively and affectively) how they contribute to organisational performance in discharging their duties (Fearon et al. 2013; Kahn 1990; Rothbard 2001). As such, workers 'do' strategy when discharging their duties in pursuit of organisational goals (Jarzabkowski and Spee 2009). Hence, workers and, in particular, their competence, in concert with other resources, are key in shaping a competitive advantage (Heinen and O'Neill 2004; Campbell et al. 2012; Collings 2014; Pease et al. 2014). Other resources include assets, systems, processes, information, firm attributes, technology and the like. The resource configuration enables the organisation to conceive and implement strategies that improve its efficacy (see Barney 1991; Cheese et al. 2008; LePak and Snell 2002; Ployhart et al. 2014; Teece 2014; Sirmon et al. 2011; Wright et al. 2014) in creating value for customers in the arenas where the organisation chooses to compete. According to Barney (1991), resources can be classified in three categories: (i) physical capital resources; (ii) human capital resources; and (iii) organisational capital resources, though not all of these have (the same) strategic relevance for the organisation. Yet all resources are required in differing degrees to compete successfully (LePak and Snell 2002; Ployhart et al. 2014; Sirmon et al. 2011; Teece 2014). The workforce must be prepared to expend their competence (available) (Wright and McMahan 2011), individually and/or especially collectively, to ensure a competitive advantage, as was discussed previously. Management plays an important role by creating an environment in which people will be available, as well as combining accessible resources to shape a competitive advantage (Campbell et al. 2012; LePak and Snell 2002; Ployhart and Moliterno 2011; Sirmon et al. 2011; Teece 2014).

5. COMPETITIVE ADVANTAGE

Competitive advantage, the hallmark of an effective strategy (Barney 1991; Campbell et al. Ployhart et al. 2014; Porter 1985; 1998), means the organisation does something better than the competition. It attracts customers based on value offered (Peteraf and Barney 2003; Porter 1985, 1998) by combining the resources at its disposal (Huselid 1995; Ployhart et al. 2014; Ployhart and Moliterno 2011; Sirmon et al. 2011; Teece 2014) to leverage their benefit for sustainable organisational performance. This description of competitive advantage shows that it is linked to the resource-based view of the firm. Barney (1991, pp.106-111) describes competitive advantage in terms of the characteristics of resources, namely valuable, rare, inimitable and non-substitutable:

> 'Resources can be valuable only to the degree that they enable an organisation to conceive of or implement strategies that improve its efficacy. Resources are rare when they are not abundantly available to competitors to implement a value-creating strategy. Valuable and rare resources can only create and sustain a competitive advantage if they cannot be obtained by competitors and thus are imperfectly inimitable. Non-substitutability means that there must be no strategically equivalent valuable resources that are themselves either not rare or inimitable.'

Thus, competitive advantage is deemed to be embedded in the organisation, and resources play a key role. Of all the resources, the workforce is the most important.

6. WORKFORCE MANAGEMENT AND CHALLENGES

Hence, for some authors, competitive advantage is achieved by a few key positions (Huselid 1995; Whelan and Carcary 2011) and/or top performers (Axelrod et al. 2001; Gelens et al. 2013; Vaiman et al. 2012) in the organisation creating an advantage over rivals. In some instances, authors refer to these performers as 'talent.' The debate about 'talent' covers the following, either as opposing positions or in some combination: whether it is subject (person) or object (competence); exclusive (a gifted few akin to top performers) or inclusive (all people but to differing degrees); unique (company-specific) or generic (applicable to a variety of contexts); and whether competence is innate (a predetermined and fixed capacity) or malleable (can be developed) (Becker 1962; Boudreau 2013; Campbell et al. 2012; Dries 2013a,b; Farndale et al. 2010; LePak and Snell 2002; Ployhart et al. 2011; Ployhart et al. 2014; Schuler et al. 2011; Tansley 2011; Teece 2014). Given the dynamic nature of relationships, the contribution of individuals to organisational performance is greater than merely aggregating individual actions (Boxall and Purcell 2011; Campbell et al. 2012; LePak and Snell 2002; Pfeffer 2001; Ployhart et al. 2011; Ployhart and Moliterno 2011; Pugh and Dietz

2008; Sirmon et al. 2011; Teece 2014; Wright and McMahan 2011). Hence, the notion that collaboration creates synergy emphasises that competitive advantage cannot be achieved by a position or person or competence acting on its own. Some combination is necessary, as shown by, inter alia, Boxall and Purcell (2011), Campbell et al. (2012), LePak and Snell (2002), Pfeffer (2001), Ployhart et al. (2011), Ployhart and Moliterno (2011), Pugh and Dietz (2008), Sirmon et al. (2011), Teece (2014) and Wright and McMahan (2011).

Thus the view taken on the workforce influences its management, which depends, inter alia, on its consequent measurement, including investing in the development of availability of a future workforce, in particular making decisions about the workers in pursuing organisational performance. Moreover, the decisions about having the right workforce available to shape competitive advantage are influenced by a myriad of factors, notably globalisation, global skills shortages, the mobility of skilled people and changing demographics, as mentioned earlier (Beechler and Woodward 2009; Farndale et al. 2010; Holtom et al. 2008; Nilsson and Elstrom 2012; Schuler et al. 2011; Vaiman et al. 2012). Of these factors influencing the availability of the right workforce, skills shortages, of which analytics, are the most important (Boudreau 2013; Harris et al. 2010; Harris et al. 2011; Kinley and Ben-Hur 2014; Lawler 2006; Phillips and Phillips 2014; Winkler et al. 2013). Moreover, workers can voluntarily relocate (Holtom et al. 2008), which is influenced by many factors and can be synthesised as ‘inducements and contributions’ (see March and Simon 1958; Holtom et al. 2008). The reasons most often advanced for voluntary turnover are improved career opportunities and enhanced work–life balance, suggesting that available workers are not properly utilised, thus affecting availability. To capitalise on the workforce and their contribution to competitive advantage, employers – and particularly line managers – should create an environment in which people feel motivated to expend their ability when given the opportunity to do so. Workforce metrics and, in particular, the intelligence gained from analytics play an important role in making sound decisions on the utilisation of workers and their competence, as well as developing competence (Boudreau 2010, 2013; Davenport et al. 2010; Harris et al. 2010; Harris et al. 2011; Kinley and Ben-Hur 2014;

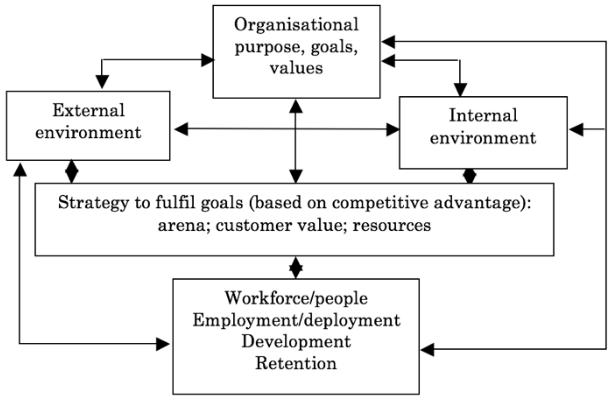

Figure 1 Workforce and their contribution to organisational performance.

Phillips and Phillips 2014) to shape competitive advantage and, thus, organisational performance. Hence, in considering the workforce and their contribution to organisational performance, attention should be given to the purpose of the organisation and the goals it pursues; strategy, and specifically competitive advantage on which strategy is based; and particularly people – in terms of numbers required, the competence needed, occupations and hierarchies affected, other resources needed to assist the workforce to discharge their duties in pursuing organisational goals; and the configuration of the people and other resources needed to achieve organisational goals, which are influenced by the environment in which the firm operates. These considerations are relevant in introducing or changing workforce metrics to gauge the impact of the workforce on goal achievement (performance). As such, these considerations are variables forming the basis of the framework we propose, which is illustrated in Figure 1.

Workforce metrics can be used to assess one or more of the components in Figure 1. Depending on the component to be measured, an appropriate metric/metrics must be selected to collect data that will yield the information and intelligence, on analysis, to make relevant decisions. Such decisions can then be assessed for their impact.

7. WORKFORCE ANALYTICS

While HR metrics, human capital metrics, talent analytics, HR scorecards and the HR information system (HRIS) are valuable for workforce management, it is suggested that there are differences in approaches (Khatri 2014, p.2). Human resource metrics and human capital metrics are qualitative in nature. Human resource metrics focus on the efficacy of the role, purpose and accomplishments of the human resources function. Human capital metrics inherently focus on employees' expressing their skills, knowledge and ability, and attempt to explain employees' contribution to organisational performance. HR scorecards, on the other hand, assist managers to determine what the HR department's worth is and they attempt to aid in HR measurements. Hence, HR scorecards focus more on the strategic requirements of the organisation. There are various HRIS software programs for managing HR activities.

It has become important for organisations to examine the effects of their investment in their workforce on the returns that they gain from such investments (Zula and Chermack 2007) in terms of organisational performance. Hence, organisations need to re-examine their workforce planning processes regularly. This will ensure that they are aligned with the objectives and initiatives of the organisation and applied appropriately so that resources are allocated to support strategy execution and thus enhance the achievement of organisational goals. Regular re-examination can benefit organisations by providing evidence of their workforce configuration and can help them to measure and plan for the correct development, allocation and alignment of people so that the organisation can sustain a competitive advantage.

When workforce practices and processes are strategically managed, organisations can gain a competitive advantage by utilising their greatest assets, namely their people (Lawson and Hepp 2005). Zula and Chermack (2007) caution that when managing the workforce of the organisation, it is important to take note of the metrics adopted to determine if the endeavour is a success. The use of inaccurate or inappropriate metrics may result in incorrect measurements, or even in measuring the wrong thing, thus adversely affecting competitive advantage.

Typically, the metrics used to measure workforce practices include numbers and costs related to the hiring, training, time to deliver services, ratios of people to budgets and benchmarks (Fitz-enz 2009). Since these measurements focus mainly on those activities that cost the organisation money and do not provide much relevant information on the value-adding aspects of the people's performance in the organisation, they do not excite management. Pease et al. (2013) concur with this view and indicate that most data collected in organisations mainly focus on the past, including records of sales, expenses, productivity and past performance data that cannot be managed any longer or make a difference to the current situation in the organisations. Hence, it has been suggested that measurements are needed on leading-edge indicators such as leadership, engagement, readiness, culture and retention. Such information can provide management with clues about the future of the organisation. For instance, engagement surveys have become prominent tools, as reflected in the Bain & Co survey (see Rigby 2015). The latest and more advanced forms of metrics are leading indicators and intangible metrics that are able to predict what is more likely to happen to the workforce. These metrics offer a much higher level of analysis and can address issues that have an effect on the current organisational operations, instead of focusing on past events. This type of metrics is proving more beneficial to organisations and has been reported to attract the attention of management (Fitz-enz 2009). With the turbulence in the 21st century economic and business environments globally, most managers want to be forewarned about what is going to happen in the future so that they can make sound investment decisions regarding workforce measurement and management.

8. PREDICTIVE ANALYTICS

To deal with the challenges that contemporary workforce changes present in organisations, more powerful means of planning and deploying appropriate development and training of people will be needed. Predictive analytics is emerging as a game-changer in current business environments (Pease et al. 2014). Predictive analytics has been defined as the use of quantitative methods to extract insight from data and then using these insights to assist organisations to make informed decisions and to forecast and improve their final business performance (Pease et al. 2014). Khatri (2014) indicates that it is a valuable tool for employees' career planning and the organisation's strategic planning. Predictive analytics can also be used for assessing employees' training needs, as already discussed. With reference to the White Paper on predictive analytics, Dey and De (2015) state:

> 'Several organizations have proactively adopted predictive analytics for their business functions such as finance and risk, customer relationship management, marketing and sales, and manufacturing and it enables them to make informed decisions across a range of activities such as customer retention, sales forecasting, insurance pricing, campaign management, supply chain optimization, credit scoring, and market research.'

Furthermore, several new opportunities are offered by predictive analytics that are useful for all the core workforce processes, such as competence acquisition, attrition risk management, employee sentiment analysis and capacity planning.

Predictive analytics can be applied to workforce learning initiatives to improve the impact of the learning and development initiatives offered in the organisation, thereby shaping competence. It gives the organisation insight into the types of employees that can benefit from the learning initiatives and those that will receive very little or no benefit at all. In this way, employees can be selected that will benefit from the learning initiatives, increasing the impact of their performance in the organisation. Organisations can then provide for those employees who would otherwise gain little or no benefit from training, saving costs by investing in suitable learning initiatives that will affect all employees, improving their performance and ability to execute the organisation's strategy and achieving organisational goals, thereby sustaining organisational performance. It has also been suggested that the best workforce metric for an organisation is the long-term performance of the organisation, which is influenced by leadership and management.

Investing in people is not new. Organisations have anecdotally been using on-boarding, skills training and development programmes for a long time now (Pease et al. 2014). However, these initiatives have not been able to indicate exactly where and how they are of value and benefit to workers or the organisation. By applying predictive analytics to these learning investments, both the organisation and workers can benefit. The organisation benefits by reducing its expenditure on training for workers that will not benefit, while improving their performance. Furthermore, it can focus on improving other business metrics. Workers benefit because they attend training and development that can actually help them to improve their performance and that is worthwhile for their specific operations. In turn, appropriate training can contribute to their increased engagement and retention in the organisation (Pease et al. 2014). This is in line with the findings of Becker (1962), LePak and Snell (2002), Sirmon et al. (2011) and Teece (2014). Predictive analytics uses scientific data as evidence for planning, developing and deploying learning and development programmes for workers.

9. REASONS FOR USING PREDICTIVE ANALYTICS FOR WORKFORCE MANAGEMENT

We agree with Pfeffer (2009, cited in Fitz-enz 2009), who stated:

> 'if competitive success is achieved through people – if the workforce is indeed an increasingly important source of competitive advantage, then it is important to build a workforce that has the ability to achieve competitive success that cannot be readily duplicated by others'.

Pfeffer's statement resonates with the research of Barney (1991), Campbell et al. (2012), Collings (2014), LePak and Snell (2002), Ployhart et al. (2011), Ployhart et al. (2014), Sirmon et al. (2011), Vaiman et al. (2012) and Wright et al. (2014). According to a 2013 global study by the American Management Association and the Institute for Corporate Productivity (cited by Reilly 2014):

> '58 percent of business leaders indicated that they believe that analytics is a vital part of their organisation today, while 82 percent of business leaders indicated that they expect analytics to be a big part of their organisation in five years'.

Sullivan (2014) concurs with this and indicates that the traditional metrics used in workforce measurement have a very limited impact since they are backward-looking and focus on the past. Predictive analytics is regarded as offering higher value and quality for organisations, as it focuses on analysing past and current data. It looks for patterns and trends that can assist managers to predict possible future people problems, as well as emerging opportunities that they can capitalise on. The Global Human Capital Trends Report (Bersin et al. 2014:117) also found that 78 percent of large organisations that have over 10 000 people in their employ realise that workforce, and specifically competence, analytics is 'urgent' and 'important.' Hence they have placed analytics as one of the top three most urgent trends for workforce management in the 21st century. The report also purports that organisations that make use of analytics successfully to manage their workforce are in a much better position to outperform their peers and competitors as far as the implementation of workforce configuration strategies is concerned. Workforce analytics, in particular, is able to provide a significant combination of workplace data and business data that can assist workforce managers to make more informed and appropriate decisions about their people for the sake of sustainability.

Sullivan (2014) indicates, inter alia, the following reasons why HR (and line) managers need to use predictive analytics for workforce management:

- It engenders a forward-looking mind-set and routinely making informed decisions based on evidence about what the future will hold for the organisation.
- It alerts managers well in advance to emergent problems and challenges so that they can prepare for their effects and minimise any damage.
- It allows managers to act strategically, ensuring that their HR plans are integrated into the organisation's strategic business plans.
- The root cause of problems can be easily identified with predictive analytics, allowing talent managers to devise appropriate solutions that solve the exact problems instead of alleviating the symptoms.
- Since predictive analytics is specifically designed to increase some form of execution to solve or enhance a situation, HR managers have a more positive attitude to accepting and reading the analysis. It also provides in-depth information, such as the estimated costs of future problems and their effects, as well as the cost to the organisation if no action is taken to improve the situation. It furthermore helps managers to prioritise problems that need immediate intervention in support of business priorities.
- Because predictive analytics is comprehensive, more integrated and usually available in an electronic form, it can provide answers to decision-makers' enquiries in a timely and consistent manner that other forms of workforce metrics usually lack.
- This form of analytics allows management to develop several scenarios or models for a specific problem situation, to pre-test the decision that they want to make, see its effects and, where possible, make adjustments before implementing it in the organisation.
- Predictive analytics allows the organisation to gain a far better workforce and competitive advantage, as compared to those competitors that do not implement predictive analytics to assist them in decision-making.

10. THE FUTURE OF PREDICTIVE ANALYTICS FOR WORKFORCE MANAGEMENT

To enable an organisation to leverage predictive analytics and obtain maximum benefits from the workforce data that it produces, it is essential to link these data sources to its strategic business outcomes, that is, it should be results-driven, as already pointed out.

Predictive analytics can be used in workforce management in the following areas, as identified by Dey and De (2015):

10.1 Employee profiling and segmentation

Predictive analytics can benefit workforce management by profiling and segmenting employees, helping managers to get a better understanding of their workforce and their contribution to organisational performance. Workforce data such as demographics, skills, educational background, experience and designation can be combined with information on roles and responsibilities to create segments that can be used to effectively deploy people. This is congruent with Boudreau (2010) and LePak and Snell (2002), who claim that the workforce will feel a higher degree of satisfaction in their jobs and their relationship with their employer will improve drastically if they are selected to attend relevant programmes that are going to benefit them the most, contributing to their availability to pursue organisational performance. This analytic forms the basis of workforce planning and engagement surveys, to mention a few.

10.2 Employee attrition and loyalty analysis

Predictive models of attrition can be used to measure the attrition risk score of individual employees. In this way, the organisation can prevent the potential attrition of their workforce that forms part of its competitive configuration. Workforce demographic data, performance, compensation and benefits data, market data, rewards and recognition data, training data, behavioural data and workforce survey scores can be used for this analysis. This metric contributes to workforce planning, employee satisfaction and commitment measurements. This analytic will ensure that organisations have the required workforce available at all times.

10.3 Forecasting of workforce capacity and recruitment needs

Organisations are in a better position to optimise resource utilisation and sustain appropriate growth and margins when they are able to predict the requirements for workforce capacity and recruitment. Accurate forecasting enables managers to determine their future staffing requirements. Factors such as attrition risk scores, business growth forecast and pipelines, number of employees and competence in each department, productivity level and past performance of each employee can be incorporated to enrich the predictive models. Again, this analytic equips organisations to be in a better position to do workforce planning.

Table 1 Top five workforce management analytical tools.

Analytical tool	Purpose of the tool
Total cost of workforce	This tool is used on a macro level to measure the alignment of the workforce (e.g. competence, 'availability' and configuration) with the objectives of the business in support of strategy implementation and to make better strategic decisions in terms of workforce management. This tool can be used effectively in combination with workforce planning, in particular, because it also helps managers to link investments in the workforce to the organisation's results.
Management span of control	Management span of control is regarded as the best tool to measure cost and structure of management staff in an organisation. It is used to assist organisations to capitalise on productivity and efficiency and can evaluate the entire organisation or specific divisions or business units in relation to business results. This tool is useful because it connects well to workforce planning, as the objectives can be displayed on a real-time basis.
High-performer turnover rate	This tool helps the organisation to see how many employees providing a competitive edge it has lost over time; to some extent, this tool is predictive in that it also indicates the value of the loss of these employees over a period of time. It also provides clues as to how productive the workforce is, which can be linked to business results.
Career path ratio	This tool provides two important measures that reflect the mobility of employees, namely *total promotions* and *total transfers*. This measures career path mobility and any internal movement of employees. This metric can be used in combination with employee retention and performance metrics, they are also able to provide valuable links to critical workforce issues, particularly productivity and organisational performance.
Talent management index	This index helps an organisation to evaluate and analyse its talent management practices for recruiting, mobility, managing performance, training and development. The above metrics can all be linked to this metric in order to ensure that the organisation's workforce is properly measured and, thus, managed. This metric can therefore be regarded as an overarching or holistic tool to manage the workforce.

10.4 Appropriate recruitment profile selection

Attrition of employees in specific roles that entail high costs of hiring can lead to significant losses for the organisation. Dey and De (2015) indicate that 'by analysing the data for current employees, including performance and productivity indices, attrition details, and life-time value', the talent manager will be in a position to create the right profile for each potential employee. Moreover, a statistical relationship can be identified between employee value and profile variables such as education and experience. This will then assist managers to identify the most suitable profiles for their organisation. The organisation can then increase the quality, productivity and customer satisfaction scores, while at the same time reducing its recruitment cost and creating sustainable value for the organisation where the strategy can be achieved, thus feeding directly into workforce management.

10.5 Employee sentiment analysis

It has been suggested that 'employee sentiment analysis is more effective than annual employee surveys in getting honest, useful feedback'. Employee sentiment analysis involves the tracking, analysing and dissecting of key issues regarded as the most relevant to employee sentiments over time, or that can be related to a specific real-time issue. Managers then obtain a better understanding of how an HR initiative, policy, organisational change or event is being received by employees at that specific time. Internal data related to the respective HR initiatives or changes, together with data from external social media such as Facebook, Twitter and LinkedIn, can be used for this analysis, thereby providing the organisation with a clear understanding of the impact that various organisational factors have on productivity, business growth or other objectives. This directly promotes proper workforce management.

10.6 Employee fraud risk management

Predictive analytics can be used by organisations to identify employees who are at high risk of non-compliance with the organisation's security policy or other rules and regulations. The organisation can strengthen its internal fraud risk management by analysing the employee activity data and incident data, using statistical modelling techniques, and then creating a fraud risk score for employees so that appropriate proactive steps can be taken to protect the organisation's brand image and reputation and prevent possible financial losses. This metric demonstrates a link to workforce management.

It may be necessary for HR managers, in particular, as they drive workforce-related issues, to collaborate with other business units in their organisations that are already using predictive analytics to get a better understanding of how to use this measurement tool. The correct application of predictive analytics can transform workforce management from a reactive to a proactive process. It will provide accurate early warnings that can support strategy more comprehensively and help the organisation to sustain itself in the long term. Furthermore, the organisation will be in a better position to solve its business problems and reduce its costs, at the same time improving business performance, employee engagement and satisfaction. If this is accomplished, organisations will be able to prove that the 'generally acceptable idea that organisations can create a competitive advantage from their workforce and their management practices, as reported by Shrimali and Gidwani (2012)' is indeed a reality.

In sum, predictive analytics can give effect to the ideas proposed by Barney (1991), Becker (1962), Campbell et al. (2012), Cheese et al. (2008), Collings (2015), Huselid (1995), Becker and Huselid (2006), Kahn (1990), LePak and Snell (2002), Macey and Schneider (2008), Ployhart et al. (2011), Ployhart et al. (2014), Saks (2006), Sirmon et al. (2011), Teece (2014), Vaiman et al., (2012) and Wright et al. (2014). Moreover, this observation corroborates Boudreau's (2010) observation that HR metrics needs retooling. To assist practitioners in applying predictive analytics, we present the top five workforce analytical tools next.

11. TOP FIVE WORKFORCE MANAGEMENT ANALYTICAL TOOLS FOR THE 21ST CENTURY

Predictive analytics, workforce analytics or even 'people analytics', as it is more commonly referred to by HR managers, has been used extensively by organisations such as Humanyze, which assists managers to 'find surprising and unsuspecting connections and insights in data about what its most effective employees do differently' (Kane 2015). The CEO of Humanyze, Ben Waber, is of the

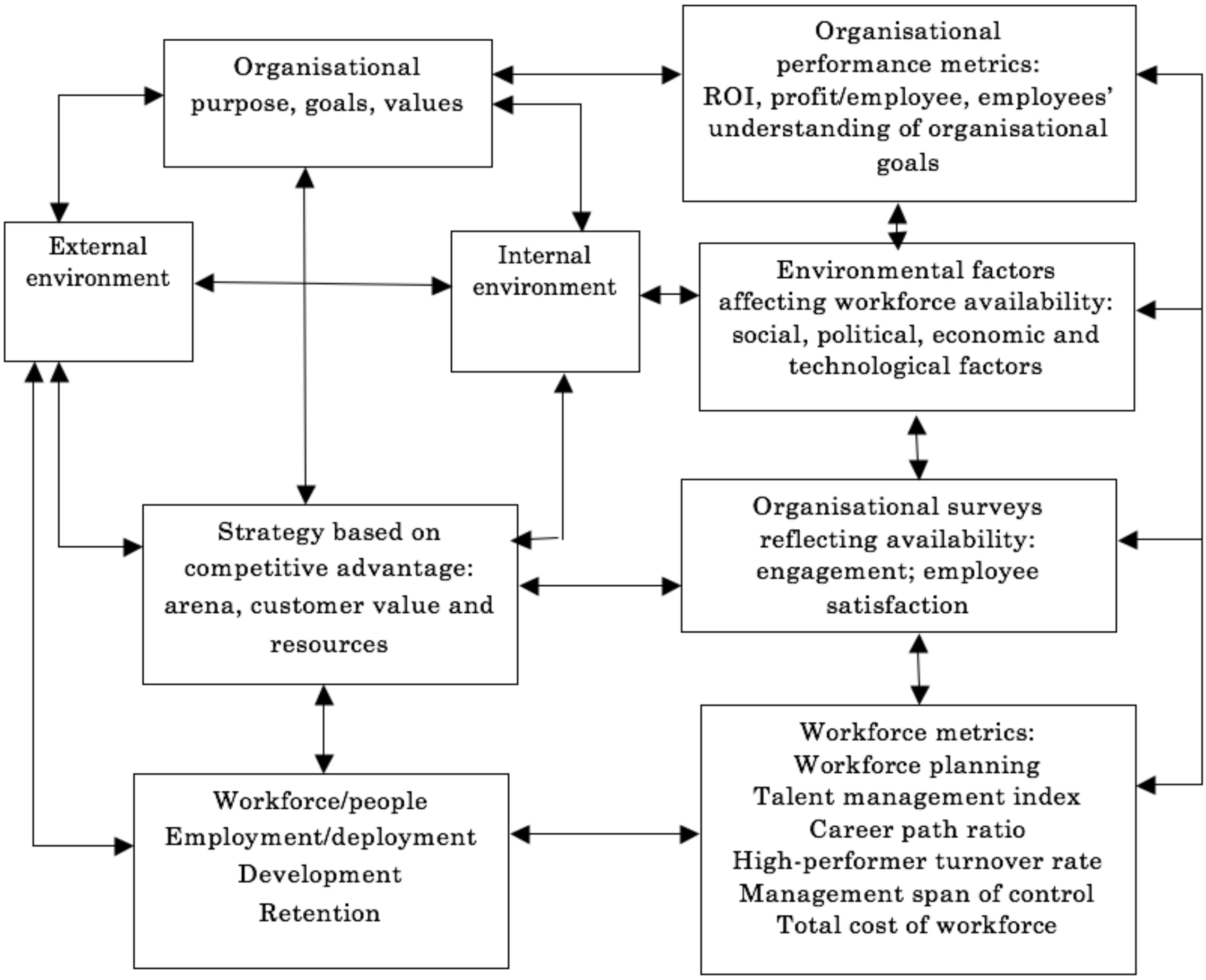

Figure 2 Integrated framework to measure and manage the workforce.

opinion that people analytics can assist managers to gain a better understanding of patterns that are usually hidden about why some employees are more successful at the jobs that they do than others. In this case, the analytics enable managers to read employees in the same way that they usually read statistics.

The SABA White Paper (2014) confirms that most of the world's advanced organisations use human capital metrics and analytical tools for managing their workforce. These tools provide managers with a more visual understanding of their workforce and enable evidence-based decision-making. The top five practical analytical tools for human capital and workforce management have been identified by SABA (2014) and are indicated in Table 1.

These tools can assist firms to identify and prioritise key questions about their workforce, especially the individuals who give them a competitive edge. These include identifying and quantifying the (strategic) competencies of people, who constitute the most important resource of the organisation, together with other resources, particularly information and technology, which enable the organisation to implement its strategy successfully. Moreover, these metrics can also show how the performance of the workforce, in concert, helps to enhance these capabilities, resulting in effective strategy implementation, as discussed in this article.

In summary, we provide an integrated workforce management framework in Figure 2.

12. CONCLUSIONS

For organisations to remain competitive, they should use workforce analytics effectively, particularly predictive analytics, derived from proven metrics suited to their context. These tools will allow the organisation to make informed decisions about workforce measurement and management and its availability in support of strategy implementation, thus securing organisational sustainability. Organisations that are successful at leveraging this form of data-driven decision-making will most certainly position themselves to outsmart their competitors and sustain a competitive advantage. At the same time, they will sustain a higher return and value to all stakeholders and society at large, and they will be able to better position themselves for the challenging business world of today, as well as the business demands of the future.

13. THEORETICAL AND PRACTICAL IMPLICATIONS

This theoretical article demonstrates that investments in the workforce – whether employment, deployment or training and development – contribute to organisational performance. In this regard, an integrated approach should be followed, starting with a consideration of the purpose and goals of the organisation and the strategy employed to pursue those goals. More particularly, attention should be given to the competitive advantage on which strategy is based, particularly people, in terms of numbers required, the competence needed, and occupations and hierarchies affected. In addition, other resources needed to assist the workforce to successfully discharge their duties in pursuing organisational goals, as well as the configuration of the people and other resources needed to achieve organisational goals, should be considered. Moreover, the environment in which the organisation operates, which influences organisational performance, should be considered. It is imperative that managers (whether HR or line) focus on results rather than inputs to ensure the analytics are forward-looking rather than backward-looking and provide relevant workforce data per 'segment' (like the quadrants suggested by LePak and Snell 2002) – indicating future needs, including training and development per segment.

14. CONTRIBUTION

The suggested conceptual framework is theoretical and requires empirical testing. It serves as an outline for future research that can be used universally by researchers.

15. FUTURE RESEARCH

Given that limited empirical evidence is available on the use of predictive analytics in the workforce, we suggest a practical investigation of how organisations (i) conceptualise their workforce; (ii) what tools they use in measuring different aspect of the workforce, including their impact on organisational performance; and (iii) predict workforce performance.

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