WILEY

HR SCIENCE FORUM

Building credible human capital analytics for organizational competitive advantage

Dana B. Minbaeva

Department of Strategic Management and Globalization, Copenhagen Business School, Copenhagen, Denmark

Correspondence
Dana Minbaeva, Copenhagen Business School, Department of Strategic Management and Globalizaion, Kilevej 14, Copenhagen, Frederiksberg 2000, Denmark.
E-mail: dm.smg@cbs.dk

Despite the enormous interest in human capital analytics (HCA), organizations have struggled to move from operational reporting to HCA. This is mainly the result of the inability of analytics teams to establish credible internal HCA and demonstrate its value. In this article, we stress the importance of conceptualizing HCA as an organizational capability and suggest a method for its operationalization. We argue that the development of HCA within an organization requires working with three dimensions of HCA: data quality, analytics capabilities, and strategic ability to act. Moreover, such work must be undertaken on three levels: individual, process, and structure.

KEYWORD
human capital

1 | INTRODUCTION

A recent study undertaken by Deloitte found that although 75% of surveyed companies believed that using human capital analytics (HCA) is important for business performance, only 8% viewed their organizational capabilities in this area as "strong" (Deloitte, 2015). Several consultancy reports and numerous LinkedIn blogs concur: Despite the vastness of available corporate data, organizations have been slow to develop their HCA capabilities. Those that have focused on such development have struggled to move from operational reporting for benchmarking and decision making to analytics in the form of statistical analysis, development of "people models," analysis of dimensions to understand cause and deliver of actionable solutions (Bersin, Houston, & Kester, 2014). A study of 255 European business and analytics professionals confirms that despite progress with operational reporting and strategic workforce planning, most organizations have yet to fully develop their analytical competencies (Kassim &Nagy, 2015).

Why do companies struggle to move to analytics? According to the Deloitte study, the main reason is the difference between average "readiness" and "importance" ratings for HR and people analytics, which Deloitte refers to as a "capability gap": "Organizations are new to this discipline, and many suffer from poor data quality, lack of skills, and a weak business case for change" (Deloitte, 2015, p. 71).

Firms may attempt to fill this capability gap by buying expensive solutions offered by external vendors. However, HCA professionals generally agree that such capabilities are best built and developed internally. Despite this widespread view, knowledge about how such in-house development should take place is lacking.

In this article, we approach this issue by arguing that achieving a competitive advantage through a sound understanding of one's own human capital requires building and developing HCA as an *organizational* capability. Based on insights from the organizational capabilities perspective (Teece, Pisano, & Shuen, 2000; Winter, 2000) and the micro-foundational view of strategy (Felin, Foss, & Ployhart, 2015; Foss & Pedersen, 2014), we conceptualize HCA as an *organizational capability that is rooted in three micro-level categories (individuals, processes, and structure) and comprises three dimensions (data quality, analytical competencies, and strategic ability to act)*.

To illustrate our arguments, we use insights from the various collaborative projects that Human Capital Analytics Group has undertaken with numerous companies in northern Europe. More specifically, over the past three years, we have followed analytics projects in six European multinationals (Shell, Novo Nordisk, Vestas, Mærsk Drilling, LEGO, and Nykredit; see Table 1 for background information). We have also participated in related focus groups, collaborated on analytics projects, and interviewed leading professionals in this field with the purpose of developing a broad understanding of

TABLE 1 Background information

Company	Industry	Size (FTE) 2015	Revenue 2015 (Euro)
Royal Dutch Shell	Oil and gas	93.000	251.013.571.429
Novo Nordisk A/S	Pharmaceutical	41.571	5.138.285.714
Vestas A/S	Wind turbines	20.507	8.974.428.571
Maersk Drilling A/S	Oil field services	3.965	711.428.571
LEGO Group	Manufacturing	88.000	38.186.285.714
Nykredit A/S	Financial services	13.974	5.111.428.571

Source: corporate websites.

HCA in various organizational settings. We also reflect on HCA projects in other companies in which Human Capital Analytics Group (www.cbs.dk/hc-analytics) has been involved (see Table 2 for an overview of four illustrative projects). We use this anecdotal evidence and examples of "what worked" to illustrate the challenges organizations face in developing HCA. In a sense, this article can be perceived as a phenomenological study with the goal of developing an "essence" description (Moustakas, 1994). We aim to describe the experience of an organizational actor (i.e., an HCA professional) looking to build and develop credible HCA within his or her organization. In this regard, our goal is to provide insights into what organizations can do to succeed in the development of a credible HCA and, in turn, create a competitive advantage.

The contribution of this article is threefold. First, using insights from the organizational capabilities perspective and the micro-foundational view of strategy, we highlight the importance of developing HCA as an *organizational capability*. Second, we put forth several theoretical propositions arguing for the need to operationalize HCA at different levels and in terms of different dimensions. Finally, we offer suggestions for the operationalization of HCA as an organizational capability that may inform future empirical research and may serve as guidelines for practice.

In the following section, we start by briefly elaborating on three dimensions of HCA. Then, we define organizational capabilities and specify their origins in terms of micro-foundational categories (individuals, processes, and structure).

2 | HCA: THE DIMENSIONS

In an increasingly competitive world, organizations need to invest in their human capital wisely in order to build and sustain their competitive advantage (Becker, Huselid & Beatty, 2009). When closely linked to an organization's business strategy (Huselid, 2015), the effective use of analytics may be "the biggest contributor to the building of great, sustainable organizations in the future" (Beatty, 2015, p. 285).

Within organizations, HCA draws on knowledge about causal models, research design, and statistics. It also goes beyond this knowledge by setting "the appropriate balance between statistical rigor and practical relevance, and building analytics competencies throughout the organization" (Casio & Boudreau, 2011, p. 14). Typically, three dimensions involved in the development of HCA in organizations are commonly discussed: data, analytics, and organizational actions (Davenport, Harris, & Shapiro, 2010; Huselid, 2015; Rasmussen & Ulrich, 2015). We briefly present these dimensions under the respective headings of "data quality," "analytical competencies," and "strategic ability to act."

2.1 | Data quality

Data quality is one of the most crucial barriers to the development of credible organizational HCA. Notably, most firms do not know what types of data are already available to them or in what form. In fact, most firms do not have the answers to some basic questions: What data do we have? Where do we store it? How was the data collected? What rules were applied? How can multiple data sets be merged into one? What are the advantages and disadvantages of each data set? How and when are organizational changes registered? Such poor organization of firm data can be very costly.

Answers to complex business problems are difficult to derive from analyses of different variables observed over several time periods and at different organizational levels (e.g., individuals, teams, departments, business units). In our experience with companies, we have found that when formal, centralized coordination of data collection is lacking, data duplication, wrong entries, and other problems

TABLE 2 General overview of the HCA projects used for illustration

Organizational context	Initiated by	Research question	Type of analysis	Business impact
1 Established and growing multinational	Upon CEO's request	What are our core values? Out of the long list of values, can we identify the core values that are most relevant for us?	Multimethod study (archival data, external search, interviews, focus group, quantitative analysis)	Answered the CEO's question, but the implications were unclear for HR managers, created a positive spin-off for other analytics projects
2 International company	Upon HR department's inquiry	How can we persuade managers involved in a talent management program to relocate internationally?	Quantitative analysis	Results were put in action by HR business partners, but didn't have high strategic impact
3 Knowledge-intensive organization	On the analytics team's own initiative	What determines individual research productivity?	Quantitative analysis	Top management listened, but there were no follow-up actions
4 Large multiunit company	Question formulated by top management	Over the past few years, the units' systems and processes have been aligned. However, we still see variance in business performance. Why?	Mixed-method (qualitative and quantitative analyses)	The results changed the mind-set of the company, transformed into a toolbox, created new performance metrics

Note. Information provided in the table is kept at the generic level due to conditions set in nondisclosure and confidentiality agreements.

are common. Such a situation makes it impossible to combine different data sets; creates unexplained breaks in time-series/longitudinal data; and leads to data inconsistencies due to the proliferation of various metrics, codings, or time frames. Accordingly, analyses based on such data are rarely comparable or combinable. Moreover, firms often fail to collect data documenting changes in the organization (e.g., business-unit reorganizations). As organizational changes can modify the relationships under study, this failure to model such processes biases the analytics-based decision-making process.

Data quality requires investments and comes at a price. For an HCA team, this creates a kind of "Catch 22": The team responsible for HCA needs data to prove its point, but top management needs proof before it will invest in HCA. As Henrik Gjesing Antvor, senior specialist in Analytics/People & Culture at Vestas Wind Systems A/S, recommends: "If you need more data, start with an initial assessment using the data you have and create a business case for gathering more data."

2.2 | Analytical competencies

The term *analytical competencies* refers to the analytics team's ability to measure variables, build causal models (i.e., conceptual models answering "why" questions; Whetten, 1989), test them in the correct way, and tell a compelling story.

Our experience shows that the analytical models often take the overly simplistic of "variable *X* leads to variable *Y*." The models seldom include control variables, moderation effects, or mediating variables. This is problematic because in any complex system, like an organization, one cannot attribute any effect to a single factor. Furthermore, in most cases, management is interested in knowing whether the relationships between *X* and *Y* will be equally strong in all circumstances, or whether there are certain conditions that make them stronger or weaker. Those conditions could be related to organizational culture, direct manager characteristics, or team composition—all of which are governance mechanisms that can be manipulated by the organization. Hence, analytical competencies are required to build the correct causal model with the necessary degree of sophistication, to operationalize it, and to test it using the appropriate statistical techniques.

The analysts should also be able to read meta-analyses and comprehend complicated academic papers in order to have an "understanding the principles of good measurement" (Huselid, 2015, p. 314). This allows them to correctly define and operationalize the variables included in the analysis. Consider, for example, an engineering consultant firm interested in measuring diversity. The analytics team receives information that the average team in this company has five people and, on average, two of the five members are female. Is this a diverse group? Given that it reflects the general gender misbalance in the educational system in engineering, it may be a good gender mix. However, what if those two females are secretaries and the three males are, in fact, engineering consultants? In that case, this is probably not a diverse group. What is needed in this case is knowledge of three distinctive types of diversity: separation, variety, and disparity. As Harrison and Klein (2007, p. 1199) argue, "failure to recognize the meaning, maximum shape, and assumptions underlying

each type has held back theory development and yielded ambiguous research conclusions."

At the European Workforce Analytics Awards, the analytics team from Royal Dutch Shell presented a case focused on measuring diversity and inclusion. As the team explained: "Given the increasing talent shortage, we know that the success and competitiveness of our business relies on our ability to attract, develop, and retain diverse talent. Consequently, we aim to create an inclusive work environment for employees in which differences are valued."[1] The analytics team developed a business case for creating metrics to measure diversity and inclusion, and to assess their impact on performance. In line with the literature (e.g., Nishii, 2013), the team correctly differentiated between these two concepts and then used the concept of fault line—a hypothetical dividing line that splits a group into relatively homogeneous subgroups based on the individuals' alignments with multiple diversity attributes (Lau & Murnighan, 1998). In the end, new metrics were created to capture the collective composition of diversity attributes. The team had to limit the diversity attributes registered in the database to gender, age, nationality, position tenure, tenure with the company, and functional background. Nevertheless, the measures were substantial. Equipped with these metrics, the analytics team was able to measure the impact of diversity and inclusion on performance and to take the moderating roles of subgroups and leadership into consideration. As the team explained: "In a case of weak leadership and strong subgrouping, the regression analysis showed that a 10% increase in diversity resulted in a 5% decrease in inclusion. In a case of strong leadership and weak subgrouping, the regression analysis showed that a 10% increase in diversity resulted in a 2% increase in inclusion. Taken together, our analysis highlights the conditions under which diversity has real benefits.[2]

In addition to the ability to build conceptual models and test them correctly, analytical competencies include the ability to communicate the results of sophisticated models to managers in terms of "telling a story" beyond *p* values. This includes educating the organization and most HR business partners in the basic logic and terminology of HCA. In this regard, consider the following illustration (Example 1 in Table 2). An established multinational was facing a significant increase in its workforce, especially abroad. Notably, this company treasured its values to such an extent that many employees took living the values of the company for granted. Given the significant international growth in the number of full-time employees, the CEO was worried about the corporate DNA—the set of beliefs that are decisive for demonstrating the type of paradigm in use within the organization and the underlying assumptions to which (most) members of the organization subscribe. He asked the analytics team: "What are our core values? Out of the long list of values [the organization has 10 corporate values], can we identify the core values that are most relevant for us?" The analytics team engaged in a well-thought-out, well-designed multimethod study (i.e., archival data, external search, interviews, focus group, quantitative analysis). This study included an analytics project in which the team successfully identified core values based on their impact on team engagement, intentions to leave, and individual and team performance. They could therefore deliver the answer. The CEO was satisfied, but the project never left the corporate office. As one HR manager said: "Now what? We do not have a Core Values

department. Where do we go from here?" In this case, the implications of a very well executed project were not easily understood by HR managers. In Whetten's (1989) terms, the answers to the "So what?" questions were not obvious enough. On the other hand, the project created a lot of positive internal PR and resulted in the initiation of several analytics projects on other subjects.

2.3 | Strategic ability to act

Broadly speaking, the organization's *strategic ability to act* in this context refers to the strategic impact of analytics projects, and whether the results of such projects are actionable and can be used for change management. As Huselid (2015, p. 312) explains, "The emphasis of the current focus on workforce analytics is … about executing the firm's strategy through the workforce." Accordingly, the true measure of the value of HCA is whether analytics projects have a strategic impact.

In many organizations, members of the top management team are not interested in investing exorbitant amounts in HCA, often because they are unsure of the likely benefits. Moreover, they feel that they already know their businesses and are good at identifying poor performers. How can top management be persuaded that HCA offers a positive return on investment? This is the biggest challenge faced by analytics teams in today's business world. The answer we found in the focal projects was simple—the results must be actionable, such that they can be easily transferred into strategic actions and, thereby, have a measurable impact.

In our work with the focal companies, we observed that the results of HCA projects may be actionable to different degrees and that they may have different degrees of strategic impact. For example, an international company based in Scandinavia (Example 2 in Table 2) struggled to persuade managers involved in a talent-management program to relocate internationally (a typical problem for European multinationals; see Mercer, 2012). The analytics team analyzed career moves in that company over a period of 10 years, and combined that data with promotion and salary data. The team found that international relocations positively and significantly correlated with future job performance, and that an international location resulted in a significant increase in future job performance. They also found that the frequency of relocations was positively and significantly correlated with future promotion. The average marginal effect suggests an increase in the probability of promotion of approximately 10%. Although these results did not have a high strategic impact, they were immediately put into action and used by HR business partners to argue for the international relocation of top talent.

Consider two other examples from Table 2—Examples 3 and 4. The knowledge-intensive organization in the first case had focused on documenting "research productivity" since 2008. For this organization, research productivity was an established (externally developed and validated) performance measure that was used to obtain external funding. An internal business intelligence unit had done a good job of collecting and organizing longitudinal data that allowed each individual's "research productivity" to be traced. An internal analytics team decided to undertake an analytics project aimed at answering the following question: "What determines an individual's research

productivity?" They connected the business intelligence unit's data covering a period of three years with individual-level data from HR (i.e., age, gender, nationality, position, tenure, workload, leaves of absence, etc., on a yearly basis starting from 2007). They also received the team-level results of the engagement survey for this period, which covered team support, job expectations, intra- and interteam collaboration, and direct managers.

On the basis of the available data, the analytics team created a model connecting individual characteristics with individual "research productivity" and used unit data as moderators. The analysts then identified the characteristics of "high performers," questioned the organization's focus on gender diversity (the results showed that national diversity mattered more for individual research productivity), and confirmed the important role of the direct supervisor. The most unexpected findings related to the impact of organizational tenure on research productivity at the individual level (negative and significant at 5% across all models)—over time, individual research productivity declined, even for external hires. This finding was also confirmed in predictive models. The analytics team brought all of this information to the top management team, which shared it with the HR department. However, no follow-up actions were taken, and the results of this analytics project did not affect decisions—the organization maintained its focus on gender diversity because, according to top management, it was the "right" thing to do and driving the nationality agenda would be more difficult.

In the second case, a large company was organized into 16 business units, all of which were independent profit centers. Analysts in the corporate HR department received an inquiry from top management about the sources of performance variations among the 16 units. More specifically, management asked: "Over the last few years, the units' systems and processes have been aligned. However, we still see variance in business performance. Why?" The analytics team engaged in both qualitative (interviews with high-performing units) and quantitative (correlating existing staff members with performance data for 2010–2011) investigations. They looked at the organizational set-up (structure, rotation principles), the organizational culture (leadership, teamwork, values, team composition), and external factors (location, customer base, unions, other agencies). The results showed that 60% of variation in units' performance was explained by a "People Index," which included factors related to team learning (17%), leadership quality (18%), and job characteristics (9%). The numbers were discussed and confirmed in qualitative interviews with the units' leaders. The analytics team correlated the "People Index" with customer satisfaction and found that the index accounted for 44% of the variance in customer satisfaction. Immediately, in collaboration with HR business partners, the "People Index" was further operationalized into a toolkit entitled "How to Build a High-Performing Team," which contained an easy-to-comprehend slide with the snapshot of the analytics project's results, a self-assessment tool, and instructions for follow-up actions (e.g., "How to use your scores," "Potential barriers and solutions," and "Process support from your HR business partner").

These two examples are similar in terms of the quality and availability of the data. They each relied on fragmented internal data that was possible to integrate with historical HR background data and

engagement surveys connected to business-relevant indicators (i.e., "research productivity" and "customer satisfaction"). Both organizations had good in-house analytical competences. However, the difference in the usability and usefulness of results is striking. In the first case, the project was not on the top management agenda and the results were never used. In the second case, the results were immediately put into action. In the case of the knowledge-intensive organization, much of the analytics work undertaken in the company was purely theoretical. In other words, analytics were not implemented or integrated into HR programs and procedures. Therefore, the analytics team found it hard to be taken seriously by top managers and struggled to gain top management's attention for HCA projects. The analytics team pondered the reasons for top management's lack of interest and concluded that it needed to be better at communicating ("telling the story") and visualizing the results.

In the case of the large multiunit company, there was support for analytics projects from top management. In fact, when the top management team observed a problem, it approached the analytics team for the answer. Moreover, the results of the projects were implemented in the HRM process and translated into specific practices. The analytics team excelled at making its work and results meaningful to top management by creating visual presentations and by using relevant business terminology when meeting with management.

Data quality, analytical competencies, and strategic ability to act represent critical elements of the effective and successful adoption of HCA in organizations. Clearly, the ideal case would be to score high on each of the three dimensions. However, our experience shows that companies struggle to achieve excellence in all dimensions. Why are some organizations better than others in this regard? We argue that successful companies approach the development of HCA as an *organizational capability*, and that they work with HCA's three dimensions at the level of their micro-foundations (Felin, Foss, Heimeriks, & Madsen, 2012).

3 | ORGANIZATIONAL CAPABILITIES: DEFINITION AND ORIGINS

Generally speaking, capabilities fill the gap between intentions and outcomes. Organizational capabilities are associated with organizational know-how that "enables an organization to reliably perform and extend its characteristic output actions" (Salvato & Rerup, 2010, p. 5). Grant (1996, p. 377) defines organizational capability as "a firm's ability to perform repeatedly a productive task which relate[s] either directly or indirectly to a firm's capacity for creating value through affecting the transformation of inputs into outputs."

Capabilities have a lot in common with routines, but the two concepts are distinct. As Winter (2000, p. 983) explains, an organizational capability is "a high level routine (or collective of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type." In contrast, routines are units, or "chunks," of organized activity with a repetitive character. As such, they serve as the building blocks of capabilities (Teece et al., 2000).

Although organizational capabilities are collective in nature, they are rooted in individuals' actions and interactions. Winter (2012, p. 1409) points out that "organizational capabilities persist in recognizable form beyond individual lifetimes and (more plainly) beyond the typical tenure of individuals in organizational roles." In many, if not all, of the companies with which we worked, the initial organizational investment in HCA and the establishment of an organizational HCA function could be traced to a specific individual—the HCA champion and change agent. Unfortunately, we also saw numerous examples in which the organizational success with HCA stopped when that individual decided to leave the organization. However, if HCA is developed as a true organizational capability, it should "stay" within the organization even if the individual—the HCA champion—leaves.

Felin et al. (2012) cluster the micro-foundational origins of organizational capabilities into three categories: individuals, processes and interactions, and structure. Individuals serve as a micro-foundation of organizational capabilities in several ways. Individual human capital in the form of knowledge, skills, and abilities (KSAs) varies significantly. Individuals also bring a high degree of heterogeneity to organizations in terms of demographic factors, such as gender and age, and in terms of values, preferences, and beliefs. Therefore, organizational capabilities are highly dependent on the characteristics of the individuals involved.

The emergence of organizational capabilities also depends on interactions between individuals and processes (Felin et al., 2012; p. 1362): "a process is a sequence of interdependent events; this baseline definition maps directly to the definition of routines ... putting processes into action requires the intervention of individuals." Examples of processes conducive to the emergence of organizational capabilities include experimentation, trial-and-error learning, ad hoc problem solving, established organizational norms, integrative mechanisms, and formal and informal methods of coordination.

Finally, structure specifies the conditions that enable or constrain interactions between individuals and processes. Examples of structures that affect the emergence of organizational capabilities are organizational design, bureaucracy, and managerial decision making.

4 | DEVELOPMENT OF HCA AS AN ORGANIZATIONAL CAPABILITY: PROPOSITIONS

We suggest that an organization wishing to develop HCA must work with its three dimensions—data quality, analytical competencies, and strategic ability—in order to act at three levels: individuals, processes, and structure. Table 3 offers an overview of the arguments, which we discuss in the following subsections.

4.1 | Individuals

At the individual level, ensuring data quality requires that members of HCA teams have KSAs that will enable them to structure, organize, and manage large amounts of corporate data. Furthermore, members of analytics teams should be able to connect and blend various sources of data and to integrate quantitative analyses with

TABLE 3 HCA as an organizational capability: Components and dimensions

		HCA dimensions		
		Data quality	*Analytics capabilities*	*Strategic ability to act*
Micro-level components	*Individuals*	Ensuring flawless data organization	Acquiring and developing analysts with needed KSAs	Encouraging boundary-spanning behaviors
	Processes	Building systems and establishing workflows	Linking with organizational processes, especially HR processes Establishing and maintaining formal and informal communications	Enabling follow-up actions via HR business partners Encouraging experimentation
	Structures	Investments in formal, centralized coordination of data collection and organization	Creating a culture of inquiry and a habit of making evidence-based decisions	Equipping top management with tools for action Linking to the current and future strategy discussions

qualitative methods (Beatty, 2015), such as interviews, focus groups, archival data analyses, and direct observations. For example, the Examples 1 and 4 (Table 2) described above included not only data from corporate value surveys but also qualitative input from key organizational stakeholders, international focus groups, external research carried out by a large global consultancy firm, and archival data. Such data blending helped the analytics teams contextualize the findings and disseminate the project's implications to a broader audience.

The individual KSAs of the analytics team are crucial for building the *analytical competencies* dimension. Companies need individuals with analytical and visualization skills that satisfy the demands for HCA within their organizations. Individuals within analytics teams must also have an in-depth understanding of the business *beyond* the HR function. As Thomas Rasmussen, VP of HR Data and Analytics at Shell, notes: "Connecting HR to HR is only interesting for HR." Business-problem knowledge must be intertwined with analytical knowledge in order to develop a detailed model of the "why" question, which can then serve as an analytical framework for data collection. However, managers often lack analytical motivation, or they refrain from engaging in analytical discussions because they possess limited statistical and econometric skills. Without such dialogues, the "why" questions cannot be properly modeled. Consequently, some key variables will not be identified, relevant data will not be collected, problems associated with the operationalization of the variables will not be anticipated, and potential pitfalls in empirical estimation will not be considered. In addition, analysts will be less efficient because of the costs associated with the ex post collection of new data, model adjustments, and delays in analysis. Moreover, HCA in such cases could produce ineffective outputs that will not support the decision-making process.

Unfortunately, problem formulation for HCA projects is still data driven in most organizations, and data mining remains the preferred solution. Although this solution can generate useful predictions, it cannot identify specific relationships among the variables. In fact, the exact nature of relationships among the variables may be intentionally "black-boxed." Therefore, HCA analytics projects based on data mining tend to only lead to incremental increases in value added. Moreover, this practice diverts the organization's attention away from identifying solutions to real business problems. In other words, data-driven questions tend to be less important for the development of the firms' long-term strategic goals.

Furthermore, there is very little experimentation with the level of analysis. Most management problems are multilevel (Hitt, Beamish, Jackson, Mathieu, 2007), but most work on HCA and, in general, management research investigates a phenomenon by conducting analyses at single levels (i.e., individual, team, or unit). This reliance on a single-level view yields an "incomplete understanding of behaviors occurring at [any] level" (Hitt et al., 2007, p. 1385).

The preceding discussion highlights why organizations look for individuals capable of building conceptual models. Jesper Randlev Nielsen, director of Performance & Workforce Management at Nykredit, explains: "I want my workforce analysts to look at the data and, instead of seeing the data problems, we want them to identify possibilities for potential HCA projects." Indeed, as Davenport (2013, p. 122) stresses, "framing a problem, identifying it, and understanding how others might have solved it in the past is the most important stage of the analytical process for a consumer of big data."

HR professionals appear convinced that companies wishing to build a credible HCA function need people with abilities that "go beyond Excel"—people capable of using a variety of statistical software packages. However, this is not just about highly sophisticated analytical skills or expensive software solutions. Esther Bongenaar, HR Analytics manager at Shell, discusses this myth:

> We undertake the majority of our analyses on laptops equipped with Excel and R. Regressions, clustering, and transformations form our basic toolkit. If you want to analyze big data, such as communication networks, or vast amounts of unstructured data, you would need more computing power. However, you may find such facilities in other parts of your company. Cooperate, learn, and share those facilities.[3]

Karl Kempf, a leader in Intel's decision-engineering group, firmly believes that "if you want to be good about analytical decision making, it is not about the math."[4] Analytics is about relationships. It is not only about having individuals on HCA teams with the right KSAs, but also about having an organization-wide network of capable individuals that HCA teams can insource if a need for additional, high-order competencies arises. The presence of such a network should also help analytics teams integrate the findings from their projects into organizations. For example, the analysts on Google's Project Oxygen team were able to identify and connect with "leading

thinkers in their functions—engineering or sales … in [the] engineering function, they call these folks tech advisers," and to persuade them that the team's findings were "viable and credible."[5] This ensured the socialization of the findings, management's buy-in and, ultimately, organizational action (Garvin, 2013).

Accordingly, organizations should directly or indirectly look for boundary spanners (Friedman & Podolny, 1992)—people who act as knowledge intermediaries among many individuals across organizations. Furthermore, in their boundary-spanning activities, individuals on analytics teams should reach outside their organizations. For example, crucial external contacts can be found in research institutions. Such contacts can be used to bridge advanced research and in-company HCA practices via common research projects. Moreover, companies may choose to host PhD projects, or to attend academic conferences and seminars.

Based on the above, we argue:

> Proposition 1: Development of HCA at the individual level requires (a) having committed individuals to ensure flawless data organization; (b) acquiring and developing analysts with needed KSAs; and (c) encouraging boundary-spanning behavior outside of the HCA team.

4.2 | Processes

At the level of organizational processes, ensuring data quality requires establishing and maintaining systems and workflows focused on data organization. Antvor notes: "It is important to have processes—systems and workflows—in place to ensure data quality. Otherwise, all responsibility lies with the employees on the team, which makes us vulnerable if a team member leaves the organization. In such a situation, our data quality is at risk."

When formal, centralized coordination of data collection is lacking, data duplication, wrong entries, and other errors occur. Firms often fail to collect data documenting changes in the organization (e.g., business-unit reorganizations). As we argued above, since organizational change can modify the relationships under study, a failure to model such change processes can bias analytics-based decision making. In turn, answers to complex business problems that rely on the analysis of different variables observed over time and at different organizational levels (e.g., individuals, teams, departments, business units) become difficult to uncover. Moreover, such situations make it impossible to combine different data sets; create unexplained breaks in time-series/longitudinal data; and lead to data inconsistencies due to the proliferation of various metrics, codings, or time frames. Accordingly, analyses based on such data are rarely comparable or combinable.

In order to build analytical competencies, analytics projects must be linked with existing organizational processes, especially HR processes. The focus should be on justifying the value added by the process in question, not only in terms of activities but also in terms of deliverables. Dave Ulrich, a professor at the University of Michigan, recalls meeting with the chairman of a bank and its top HR people. He states: "The training person said that 80% of employees have done at least 40 hours in classes. The chairman said, 'Congratulations.' I said,

'You're talking about the activities you're doing. The question is, what are you delivering?'" (Hammonds, 2005, p. 3).

The linkage of the results of HCA projects with existing organizational processes also enables HCA teams to drive the agenda within problematic areas. For example, diversity has long been on the agenda in Vestas. Antvor explains:

> We investigated each HR process (i.e., hiring through termination) and looked for differences in the ways we worked with women and men, and with Danes and non-Danes. … We discovered that there were different hiring rates for women and non-Danes among the various business units, even after controlling for relevant factors. Moreover, we found that female managers tended to hire diverse teams, while male managers did so to a lesser extent.

At Maersk Drilling, the challenge was to move employee engagement up on line managers' priority lists. As Peter V. W. Hartmann, business intelligence expert at Mærsk Drilling, explains, the analytics team managed to do so by "showing clear links among aspects of employee engagement, safety, and performance. … This helped drive an agenda of 'employee engagement matters."

Finally, at the organizational-process level, the establishment and maintenance of formal and informal interactions with HR business partners (HRBPs) are crucial for developing a strategic ability to act. Pete Jaworski, director of Global Mobility & HR Analytics at Novo Nordisk, states:

> When we speak of building organizational capabilities for applying "human capital analytics" techniques that address business challenges, HR business partners [HRBPs] play a key role. Their insights into the present issues and the future concerns of the various business lines enable them to easily identify which business challenges can and should be prioritized for taking a closer "look" through HR data. New insights generated from data analysis can inform discussions and may influence decisions within the business management teams they support.

Jaworski's team is now a Center of Excellence focused on supporting Novo Nordisk's HRBP community. The team reaches out to HRBPs to talk about data availability and quality, and to explain the specific reports and analytical deliverables available to HRBPs as managerial tools. "HRBPs are the primary 'consumers' of HR data in Novo Nordisk, and we recognize that they are in the best position to drive human capital's 'analytical impact,'" comments Jaworski.

Overall, we suggest:

> Proposition 2: Development of HCA at the processes level requires: (a) building systems and establishing workflows to continuously support data quality, (b) linking the results of analytics projects with existing organizational processes, and (c) encouraging experimentation and enabling follow-up actions via HRBPs.

4.3 | Structures

Deloitte's 2015 report on the state of workforce analytics in Europe predicts growing investments in analytics, with more than half of the survey respondents highlighting intentions to invest more in skills development and data-system improvements. The report also states that "more than 70% of our respondents are upgrading or have recently upgraded their core HR systems with the new cloud platforms" (Deloitte, 2015, p. 75). At the organizational-structure level, a commitment to data quality encompasses investments in robust system solutions, integration with other organizational platforms, and a well-developed information technology (IT) infrastructure.

The development of HCA as an organizational capability requires the development of social structures and an organizational culture conducive to analytics. The easiest approach is one that starts from the top. In other words, top management needs to acknowledge the importance of HCA for the organization. A shift in strategic priorities and the identification of HCA as a strategic priority are definitely helpful. In the diversity example from Vestas, management's support was decisive in establishing more inclusive management practices. As Antvor explains:

> Management appreciated our analysis, especially because it covered our own staff and identified what was happening within Vestas. We are a company that is becoming more diverse due to increasing international operations and the rise in the number of female graduates. Management can use the analytics-based knowledge to help handle the increasing diversity of our team. In addition, management communicated the results to different parts of the organization in order to encourage inclusive management practices. We also introduced external reporting on the number of women and non-Danes in management. Over time, we have seen that the proportion of non-Danes, in particular, has grown substantially.

Another example in which top management put analytics projects on the priority list is found in the LEGO Group. Thomas Møller Jeppesen, HR manager for the LEGO Group, explains: "The LEGO Group has historically had very high employee-engagement scores—consistently around 14 points above the benchmark. The annual Pulse survey has shown that although engagement scores remain high, the organization has experienced a decline in the employee net promoter score (E-NPS)."[6] This trend worried management and the owning family, which have always been dedicated to high employee engagement and to ensuring that LEGO is a great place to work. LEGO's CEO, Jørgen Vig Knudstorp, expressed his commitment in the following words: "I shall be keeping very closely in touch with the group and its activities, and Corporate Management will make sure that it together with its 1500 people leader colleagues put extra focus on the Pulse follow-up."[7] With this blessing, an analytics project was launched. However, it quickly became clear that different people read and interpret data differently. Therefore, the challenge for Jeppesen was to put together a diverse taskforce that represented various organizational stakeholders with different views on data-driven decision making. According to Jeppesen, immediately after these results were announced,

> We set up a task force consisting of people from HR, business-unit management, and corporate management. The owning family was also consulted. Our purpose was to look into the root causes of the decline in willingness to recommend the LEGO Group as an employer and into initiatives we could implement to ensure that we achieved our ambition of being the best place in the world to work.

The task force secured a mandate to act on the data by either involving senior leaders in the process or by ensuring top management's sponsorship of actions.

In sum, organizational inertia, cultural issues, general employee discomfort with analytics, a lack of understanding of how findings from analytics projects will be understood by management, and a failure to accurately predict likely follow-up actions may create social barriers to HCA development within organizations. At the organizational-structure level, "making the objectives, processes and results of Workforce Analytics initiatives clear and transparent throughout the organization as well as providing opportunities for employees to actively participate in the process may enhance employee trust and create a positive attitude" (Kassim & Nagy, 2015, p. 11).

However, the aim is not always to please the top management team or to find data to support the CEO's most recent idea. "All organizations seek to please the leader," explains Gary Loveman of Caesars Entertainment Corporation, "so it's critical to cultivate an environment that views ideas as separate from people and insists on rigorous evidence to distinguish among those ideas" (Davenport, 2013, p. 123). This requires more than just a culture of inquiry. The focus must be on creating not only a habit of obtaining answers but also a habit of taking responsibility.

Accordingly, we suggest:

> *Proposition 3: Development of HCA at the structures level requires: (a) continuous investments in formal, centralized coordination of data collection and organization; (b) creating a culture of inquiry and a habit of making evidence-based decisions; and (c) equipping top management with tools for action, which should be linked to current and future strategy discussions.*

Three propositions focus separately on the individual, process, and structure levels. This simplification was necessary to develop the arguments. However, as Felin et al. (2012) argue, the micro-foundations of organizational capabilities include not only the identified components—individuals, processes, and structures—but also "*interactions* within and across components ... that contribute to the aggregation and emergence of the collective constrict" (p. 1365; emphasis added). This line of research argues for the need to "decompose macro-level constructs in terms of the actions and interactions of lower level organizational members, understand how firm-level performance emerge from the interaction of these members, and

how relations between macro variables are mediated by micro actions and interactions" (Foss & Pedersen, 2014, p. 1). In fact, there could be strong interdependence between an individual's action and those of others in the same context, especially when the actions are explicitly "strategic" in the sense that actors take the actions of other actors into account (Abell, 2003). While we acknowledge that organizations as systems of interdependent actions suffer from such common problems as free riding, moral hazard, and opportunism (e.g., Coleman, 1986), as well as problems of coordinating actions, we would nevertheless follow the logic advocated in the micro-foundational view of strategy. This view argues that the positive aggregation from micro to macro. Accordingly, we argue:

> Proposition 4: Development of HCA as an organizational capability requires working with the all three dimensions of HCA—data quality, analytics capabilities, and strategic ability to act—simultaneously at the individual, process, and structure level.

Explaining such interdependencies has proven to be a "main intellectual hurdle both for empirical research and for theory that treats macro-level relation via methodological individualism" (Coleman, 1986, p. 1323). Taking them further could be done by two paths of analysis: "aggregating from microfoundational components to collect (organization) level constructs, and disaggregating collective (organization) level constructs into their constituent microfoundations" (Felin et al., 2012, p. 1358). In the following, I highlight possible avenues for research and practice that can advance this topic.

5 | WHERE TO FROM HERE?

5.1 | Future research directions

The four propositions formulated above are very generic in their nature. Further, while focusing on the propositions, we assumed but didn't explore in detail the role of the organizational context and the link to the general business strategy. Future research should attend to this limitation. In our work with companies, we were often asked, "How can the analytics team convince top management that they are capable of producing value?" First and foremost, HCA must be linked to the business strategy or the strategic intent of the company. HCA should then be understood as a strategic business process—one of several interrelated business processes that link business strategy and

edge business performance (in line with the logic advocated by Becker & Huselid, 2006). A "business process" refers to the way in which the competitive potential of a firm's resources and capabilities are realized (Ray, Barney, & Muhanna, 2004). Given its firm specificity, which implies both effectiveness and difficulty of imitation, a business process may result in a superior performance and ultimately a sustained competitive advantage. In more concrete words, the analytics team should "start by asking itself why they want to use analytics—is it because it is the latest trend or because your business needs it? How is this connected to your business strategy? How does it ensure implementation of your business strategy? Answers to these questions should help you answering the next important question: what do you want to learn from using analytics?"says Hartmann,

Equally, there is a strong need for further theoretical work that systematically links HCA with organizational performance in a strategic context. Researchers should comprehensively identify and meticulously theorize the relevant causal mechanisms and variables involved when proposing that HCA when developed as organizational capability can lead to superior organizational performance. Figure 1 shows how this work could build on the four propositions developed in this article.

The figure obviously simplifies the complicated causal mechanisms, relations of embeddedness, and much else, with "arrows" linking various "nodes" located at multiple levels of analysis. However, it is a useful first step toward identifying implications for future HCA-related research. We are not looking for confirmation of the whole model presented in Figure 1. However, through this visualization, we stress our overall argument that to achieve superior performance and ultimately competitive advantage, there is a need to develop HCA as an organizational capability, linked to the overall business strategy. To develop these arguments further, there is a need for explorative, inductive, and process research (Eisenhardt, 1989) in this area. In terms of the preferred research method, methodological triangulation is recommendable (Creswell, 1994).

Theory building in this area can be enhanced by applying a multi-level research logic that distinguishes among individuals, processes, and structures. This conceptualization has implications for research design, as there will be a need for multisource and multilevel data from multiple organizational contexts. Clearly, meeting this need will be challenging, and gaining access to this kind of rich data will most likely be one bottleneck when attempting to proceed with this line of research.

Large-N empirical research into the value of HCA can be advanced by verifying the multidimensional nature of HCA as an organizational capability. Three dimensions of HCA are identified
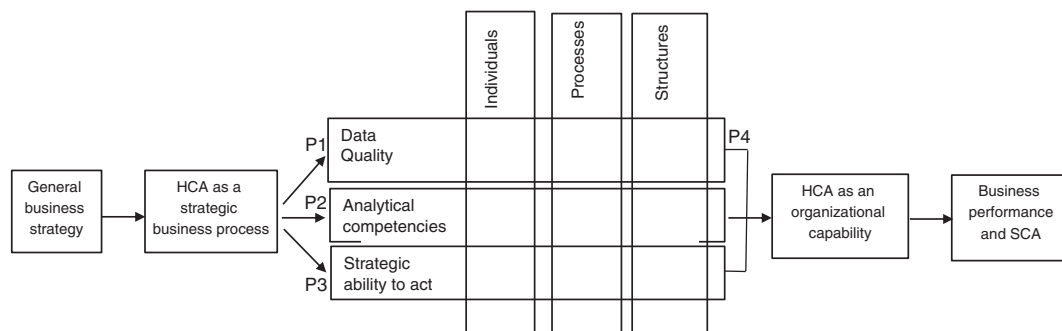

FIGURE 1   HCA as an organizational capability for strategy implementation

TABLE 4 Suggestions for HCA operationalization

Dimensions	Subdimensions	Questions Overall: To what extent do the following statements correspond to/describe your company's current situation? Scale: To a very great extent; To a great extent; Neutral; To a small extent; To no extent at all; Do not know/does not apply
Data quality In this section, you will be asked to evaluate the quality, availability, and quantity of human capital data in your company. Human capital data refers to all kinds of people-related data, including demographic data, data about HR practices (e.g., compensation, talent, and development), and soft performance data (e.g., engagement, satisfaction and turnover).	Data quality	We have reliable human capital data that we trust.
		The human capital data that we have available is mainly unstructured/unorganized. (reverse)
		We have many incorrect entries in our human capital data. (reverse)
		Our human capital data is difficult to integrate (e.g., because it is stored in different places). (reverse)
		We can locate individuals in teams in our human capital data.
		In our human capital data, we can trace an individual's movements within the organization.
	Data quantity	We have a large amount of human capital data.
		We have human capital data that has been collected over several years.
	Processes	We have implemented an enterprise resource planning (ERP) system that we use to collect, store, and manage human capital data.
		We have standardized key metrics embedded in our reporting.
		We are able to blend internal corporate data with data from external sources (e.g., public information, market growth, and trends).
		We have processes in place to ensure the quality of our data (e.g., training and handbook/guidelines for data entry).
		We collect human capital data on a regular basis.
	Data organization	We can organize all of our human capital data at the individual level.
		We only have individual-level human capital data on our managers. (reverse)
		Our human capital data is mainly at the team or department level (i.e., not at the individual level). (reverse)
		We use our human capital data for regular operational reporting.
Analytical competencies In this section, you will be asked to evaluate your company's analytics capabilities. These statements refer to your statistical skills and those of your team, your abilities and those of your team to visualize and communicate the results, and to your more general abilities.	KSAs of the HCA team	I or my team members have the analytical skills needed to run statistical models (e.g., regression analysis).
		We use Microsoft Excel to analyze our human capital data. (reverse)
		I or my team members have all of the analytical skills needed to satisfy business demands for human capital analytics.
		We can easily "tell a story" from our results.
		We are capable of communicating our results in a way that makes them comprehensible for business purposes.
		I or my team members are capable of using different statistical software packages (e.g., SPSS, SAS, R, or Stata).
		We are unable to derive analytical models that can help us answer business questions. (reverse)
		We lack the skills needed to produce standardized key metrics. (reverse)
		We are good at visualizing our results for communication purposes.
		We struggle to move from standardized key metrics to analytical models. (reverse)
	Boundary-spanning role	If I need analytical skills, I know who to contact in my organization (beyond my team).
		We attend conventions, courses, and seminars in order to stay up to date on current trends.
		We integrate academic research and external statistics into our work.
	HR business partners and performance implications	HR business partners are "consumers of analytics" (e.g., they generate hypotheses, evaluate results, and develop recommendations).
		We can document the impact of human capital on business performance.
		HR business partners are able to easily draw managerial implications from the results of analytics projects.

TABLE 4 (Continued)

Dimensions	Subdimensions	Questions Overall: To what extent do the following statements correspond to/describe your company's current situation? Scale: To a very great extent; To a great extent; Neutral; To a small extent; To no extent at all; Do not know/does not apply
Strategic ability to act		
In this section, you will be asked to evaluate your company's strategic ability to act. This refers to whether top management supports human capital analytics projects and whether the results of such projects are used for change management.	Top management attention	We have the attention of top management.
		The insights that we produce from our data are taken seriously by top management.
		We regularly communicate insights gained from human capital analytics projects to top management.
	Resource investments	We have top management's support for human capital analytics projects.
		Our company makes human capital analytics a priority by investing in them.
	Knowledge of strategic intent	We are aware of the key business challenges that our business will face in the next few years.
		We proactively search for interesting new questions that can be investigated through the use of human capital analytics.
	Results are in use	The data-driven insights that we provide are not used by our organization's stakeholders. (reverse)
		Organizational politics prevent the implementation of the evidence-based decisions that we suggest. (reverse)
		We inspire relevant organizational stakeholders (e.g., line managers and HR business partners) to take action on the basis of our findings.
		We have success stories in which our human capital analytics projects have been used for action.
		We justify the need for analytics through the use of analytics.
	Other stakeholders	We make the findings visible to all relevant stakeholders by means of regular communication.
		As members of the human capital analytics team, we feel isolated from the rest of the organization. (reverse)

above: data quality, analytics capabilities, and strategic ability to act. At this stage, established measures for capturing these dimensions are absent. With the aim of helping developing such measures, Table 4 presents the potential subdimensions that could potentially be used for coding of qualitative studies. The table also includes examples of questions that may be useful for capturing these subdimensions in quantitative studies (e.g., as items in a questionnaire-based survey). The wording of these questions was discussed with seven academics active in this line of research and with five HCA practitioners.

If future studies use the suggested questions as potential question-naire items, they must first be validated. The questions must be exposed to repeated exploratory analyses and then to confirmatory factor analyses, as the underlying factor structure is hard to specify a priori. In addition, differences in organizational size, industry, and revenue are likely to affect the relations between HCA activities and organizational performance. As such, these factors must be included as controls. We also recommend keeping the country constant, as different countries have different legal requirements relating to individual data usage.

5.2 | Moving on: Implications for HR practitioners

Numerous blogs on HR analytics and practitioner-oriented publica-tions (e.g., Hammonds, 2005) blame the HR function for being unpre-pared to meet the challenge of human capital analytics and delivering the expected value. Analytics professionals wonder whether HR will

lose the battle over analytics. Karen O'Leonard, Global Client Solu-tions leader at Towers Watson, comments:

> Most CFOs are in a position of power within their orga-nizations. They already control much of that data on company financials and operations. They have credibility and are seen (in many companies) as the source of truth. They understand data and know how to use it. In many organizations, HR falls short on all of the above.[8]

Rasmussen and Ulrich (2015) recommend taking HR analytics out of the HR department, at least until the HR function matures. Ulrich and Dulebohn (2015, p. 202) concur: "Keep ownership and accounta-bility of HR analytics with line managers." While we share these con-cerns about the readiness of HR function, we suggest shifting the discussion from where the analytics function should reside in the organization toward how (e.g., at what levels and through which mechanisms) HCA as an organizational capability should be developed.

The questions suggested in Table 4 could be used as a self-measuring tool and for benchmarking against other companies.[9] Knowledge of one's own HCA profile is crucial and an understanding of the current stage of a company's analytics evolution is key. How-ever, it may be even more important for companies to work toward a deep understanding of what is needed to advance to the next level in their HCA journey.

For analytics teams, the challenge of serving as effective boundary spanners remains and is likely to grow. Boundary spanners foster the creation of trust, and they enhance willingness of their networks' members to share knowledge. As such, they minimize the not-invented-here syndrome and maximize organizational buy-in. Moreover, they gather, filter, and deliver a wide range of knowledge across the organization. All of these activities are intrinsic in nature. Therefore, the analytics team should comprise not only people with sophisticated statistical KSAs but also individuals with high degrees of intrinsic motivation, diverse backgrounds, and the ability to create and utilize networks across organizational boundaries.

Further, HR professionals tend to put too much weight on statistical expertise. While it is beneficial to "keep up with your quants" (Davenport, 2013), analytics is not about statistics—it is about the story. Quantitative analyses alone cannot provide the full story. The results need to be understood and interpreted within the organizational context. Companies cannot expect quantitative experts to come up with all of the answers. Such experts might provide multiple ideas, but management teams will need to use their own judgment to pick the right relationships. Experts can handle data mining, but management will need to interpret the results with caution. When a data set covers 35,000 respondents, everything will appear significant. Experts can present the outputs of regressions, but management will need to take those outputs beyond the R-squares to find a meaningful story.

Finally, here is our advice to HR business partners. Regardless of where your organization finds itself at the moment, performance-led HR is the future and HCA is one vehicle that could bring you into that future. The value of HCA for performance-led HR does not lie in gathering big data, producing extensive dashboards, or making gigantic spreadsheets. In the analytics revolution, the battle for HR lies in:

- Changing mind-sets, attitudes, and habits associated with the use of evidence for decision making;
- Asking the right questions—those questions that link strategies, people, and performance; and
- Accepting responsibility for implementing change, and for managing the changes in culture, process, behaviors, and capabilities that result from analytics initiatives.

6 | CONCLUSION

Rasmussen and Ulrich (2015) ask whether HR analytics is a management fad. Ulrich and Dulebohn (2015) question if HR analytics has a realistic chance of proving its value by enhancing organizational performance. The experiences with HCA gathered from different organizations and presented here seem to illustrate a shared understanding of the importance of developing HCA as organizational capability and its value for organizational performance and, ultimately, organizational competitive advantage.

NOTES

1 Presentation at the European Workforce Award Case Competition, Amsterdam, 2015.

2 Presentation at the European Workforce Award Case Competition, Amsterdam, 2015.

3 http://www.inostix.com/blog/en/debunking-five-predictive-hr-analytics-myths/

4 http://chiefmartec.com/2011/03/analytics-its-not-about-the-math/

5 https://hbr.org/video/2761856636001/how-google-proved-management-matters

6 E-NPS: An expression of how keen employees are to recommend their workplace to others.

7 "Employee motivation and satisfaction intact—despite local differences," Pernille Stanbury, LEGO Corporate Communications, December 12, 2014

8 http://www.bersin.com/Blog/post/Will-HR-Lose-the-Battle-Over-Analytics.aspx

9 The tool is available at https://goo.gl/N8mc5B

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AUTHOR'S BIOGRAPHY

DANA B. MINBAEVA is a Professor of Strategic and Global Human Resource Management at Copenhagen Business School. Her research on strategic and international HRM, knowledge sharing and transfer in MNCs has appeared in such journals as *Journal of International Business Studies*, *Journal of Management* Studies, *Human Resource Management*, and many others. She received several national and international awards to research achievements, including the prestigious JIBS Decade Award 2013. Dana Minbaeva is the founder of the Human Capital Analytics Group at CBS.