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Revisiting the human resource architecture: Contextual influences on human capital allocation

Author:
Samuel Eyamu[1,2]

Affiliations:
[1]Department of Management and Marketing, Faculty of Business and Economics, University of Melbourne, Melbourne, Australia

[2]Department of Management and Administrative Sciences, School of Management and Entrepreneurship, Kyambogo University, Kampala, Uganda

Corresponding author:
Samuel Eyamu,
seyamu@kyu.ac.ug

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Purpose: This study investigates how both internal and external contextual factors influence the differentiation of human resource (HR) systems within manufacturing firms. Specifically, it examines the influence of competitive strategy, union density, management-employee cooperation, environmental dynamism and technological opportunities on the strategic value and uniqueness of human capital.

Design/methodology/approach: The study draws on quantitative data collected from 200 medium- and large-sized manufacturing establishments in Australia. It employs a range of statistical techniques, including analysis of variance (ANOVA), analysis of covariance (ANCOVA) and independent samples *t* tests, to analyse the relationships between contextual factors and human capital allocations.

Findings/results: The findings reveal that contextual factors, including differentiation strategy, collaborative management-employee relations and technological prospects, exert a considerable influence on the strategic value and uniqueness of human capital. Union density influenced only the strategic value of human capital, while environmental dynamism and cost leadership strategy had negligible effects on human capital allocations.

Practical implications: The results provide empirical knowledge by urging organisations to customise and modify their HR frameworks by evolving contextual variables, thereby augmenting organisational flexibility and the proficient administration of heterogeneous human capital.

Originality/value: The study extends the HR architecture framework by incorporating contextual variables, offering a more comprehensive understanding of HR system design. It provides valuable insights for HR professionals, policymakers and scholars.

Keywords: contextual factors; differentiated human resource systems; human resource management; human resource architecture; human capital.

Introduction

Recent research has focused on how firms develop differentiated human resource (HR) systems to manage diverse human capital categories (Eyamu et al., 2023). A foundational framework in this area is Lepak and Snell's (1999) HR architecture model, which explains how organisations tailor HR practices to distinct types of human capital. However, this model has predominantly emphasised internal job-based characteristics, paying insufficient attention to the broader contextual factors that influence the design and application of HR systems.

This omission is significant in today's dynamic business environment, where contextual factors greatly influence HR systems (Nieto-Aleman et al., 2023). Prior studies have shown that contextual factors like industry membership (Lepak et al., 2007) and regional differences (Luo et al., 2021) influence human capital allocation, yet there is a dearth of studies on the integration between contextual factors and human capital allocation.

Therefore, this study focuses on how specific contextual factors – competitive strategy, union density, management-employee cooperation, environmental dynamism and technological opportunities – influence the configuration of the HR architecture. It builds on three interrelated theoretical frameworks to explain how contextual factors shape HR architecture: the job-based model (Becker & Huselid, 2006), internal labour market (ILM) theory (Doeringer & Piore, 1971) and the flexible-firm model (Atkinson, 1984). These theories provide

complementary insights into how organisations identify strategic jobs, structure internal employment systems and tailor HR systems based on both internal structures and external demands.

This study makes several contributions. Firstly, it extends the HR architecture framework by incorporating contextual variables, allowing for a deeper understanding of how organisations identify essential jobs and design HR systems that cater to their unique contexts. Secondly, by synthesising multiple theoretical perspectives, it clarifies the complex relationship between context and HR systems, supporting Mayrhofer et al.'s (2021) argument that strategic human resource management (HRM) must consider contextual variability for effective HR investments. Practically, these findings guide organisations to make more informed HR decisions, helping them customise HR systems to navigate challenges and enhance resilience and competitiveness.

The article begins by reviewing the relevant theoretical frameworks, then develops hypotheses on human capital distribution across employment structures and how contextual factors influence HR systems. Finally, it presents empirical findings along with their theoretical and practical implications.

Literature review

Theoretical frameworks

Lepak and Snell (1999, 2002) emphasised the strategic importance and distinctiveness of human capital for competitive advantage. They identified four employee categories under internal (knowledge-based and job-based employees) and external (contractual work arrangements and alliances) employment structures as depicted in Figure 1. Knowledge-based workers are highly strategic and unique, while job-based workers, although strategic, are less unique. Contractual employees have low strategic value and uniqueness, while alliance workers are highly unique. Their empirical work confirmed the variability in human capital's strategic value and uniqueness across these groups (Lepak & Snell, 2002).

Recognising the challenge of maintaining an effective HR architecture in dynamic environments, Lepak and Snell (1999) stressed the importance of incorporating contextual factors into the HR architecture framework to develop more adaptable HR systems.

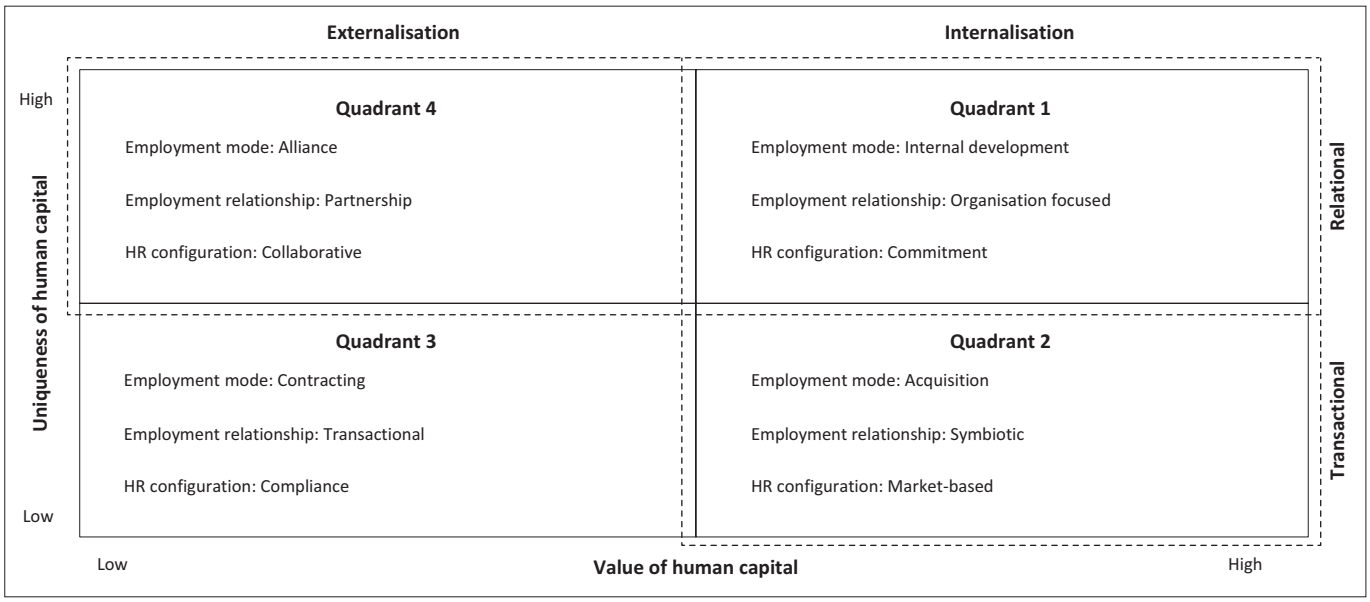
Accordingly, this study draws on the job-based model (Becker & Huselid, 2006), the institutional perspective on ILM theory (Osterman, 2011) and the flexible-firm model (Atkinson, 1984) to explore contextual factors influencing the HR architecture.

The job-based model

The job-based model suggests that an organisation's strategy drives the development of strategic capabilities (Becker & Huselid, 2006), including activities like strategic planning, partnership formation and product development (Pitelis et al., 2023). These capabilities are often embedded in strategic jobs, which significantly contribute to value creation. Therefore, by aligning HR practices with the organisation's competitive strategy, organisations may guarantee that their workforce possesses the necessary abilities and expertise required to execute these strategic capabilities effectively.

Internal labour market theory

Osterman's ILM theory (2011) explores how formal and informal institutions shape internal labour markets. It



Source: Eyamu, S. (2019). *Antecedents and consequences of human resource differentiation*. Unpublished doctoral dissertation, University of Melbourne, p. 31
HR, human resource.

FIGURE 1: The human resource architecture model.

focuses on power dynamics in employment relationships and their influence on ILM outcomes, including cooperation and conflict (De Prins et al., 2020). Cooperation, often marked by mutual trust and long-term orientation (Bray et al., 2020), enables firms to invest in knowledge-based employment arrangements with high human capital value and uniqueness.

The flexible-firm model

The flexible-firm model (Atkinson, 1984) categorises employees into core and peripheral groups, each requiring distinct HR practices. It explains how firms adapt their workforce structure in response to external pressures such as market dynamism and technological opportunities. Core employees provide resource or functional flexibility, while contingent workers offer numerical or co-ordination flexibility. In dynamic environments, firms may prioritise either resource flexibility (by employing knowledge-based workers) or coordination flexibility (through contractual arrangements) (Lepak et al., 2003).

Scholars have since extended this model to show how dynamic environments shape HR practices (Nieto-Aleman et al., 2023). Moreover, empirical evidence shows that both environmental dynamism (e.g., Akanpaaba et al., 2022; Lepak et al., 2003) and technological opportunities (Eddleston et al., 2008; Heredia et al., 2022) influence firm performance. However, their influence on human capital allocation is less understood. Consistent with Zhang-Zhang et al. (2022), the author contends that firms facing these pressures are more likely to develop employees' skill sets, fostering innovation and competitiveness.

Hypotheses development

Strategic value of human capital

According to Lepak and Snell (1999, 2002), the way employees are assigned to specific employment arrangements depends largely on the strategic value and uniqueness of their human capital. Strategic value reflects a firm's ability to exploit market opportunities and mitigate external threats (Barney & Wright, 1998). Resources can create value either by enabling product differentiation or by reducing costs (Cooke et al., 2021). Empirical studies suggest that valuable resources improve firm performance (Sahibzada et al., 2022). Consequently, employees possessing high-value human capital are more likely to be retained through internal employment modes, particularly knowledge-based or job-based systems (Luo et al., 2021). Lepak and Snell (2002) observed that such arrangements exhibit higher strategic value compared to alliance-based or contractual alternatives. This study tests that proposition in a new context:

H1: Human capital with high strategic value will be allocated to knowledge-based and job-based employment, while human capital with low strategic value will be allocated to contract work and alliances.

Uniqueness of human capital

Human capital that is unique or rare encompasses firm-specific skills that cannot be easily imitated by competitors (Lepak & Snell, 2002). Employees with unique human capital, often referred to as 'rainmakers', contribute to innovation and competitive advantage (Cooke et al., 2021). Lepak and Snell's (2002) findings indicate that uniqueness tends to be more pronounced in knowledge-based and alliance employment structures than in job-based or contractual setups. Based on this, it is hypothesised:

H2: Human capital with high uniqueness will be allocated to alliances and knowledge-based employment, while human capital with low uniqueness will be allocated to contract work and job-based employment.

Competitive strategy and human capital allocation

Building on Porter's (1980) generic strategies, numerous scholars argue that firms primarily pursue two main competitive strategies: cost leadership and differentiation (e.g., Tavalaei & Santalo, 2019; Wang & Verma, 2012).

Cost leadership strategy focuses on achieving competitiveness by reducing production costs and offering products or services at lower prices (Lee et al., 2010). Firms adopting this strategy often employ new technology, increase production scale or streamline processes to achieve greater economies of scale and minimise expenses (Islami et al., 2020). Administrative HR practices, such as using contingent employees and hourly pay, are also common in cost leadership firms (Takeuchi, 2009). Wang and Verma (2012) suggest that such firms typically create positions requiring routine, generic, and unskilled human capital.

Conversely, firms pursuing a differentiation strategy aim to compete through quality, innovation or unique offerings (Knight et al., 2020). These organisations often require skilled employees capable of delivering such distinct value (Galbreath et al., 2020). Accordingly, they invest in HR practices that build human capital value and uniqueness, including rigorous selection, developmental appraisals, team incentives and competitive pay systems (Arthur, 1992). Supporting this view, Lepak et al. (2007) observed that firms with a strong innovation focus employed high-involvement HR (HIHR) systems more extensively for core employees than firms with limited innovation emphasis. Building on this, it is predicted:

H3a: The variability in human capital strategic value will be higher in establishments pursuing a differentiation strategy than in those pursuing a cost leadership strategy.

H3b: The variability in human capital uniqueness will be higher in establishments pursuing a differentiation strategy than in those pursuing a cost leadership strategy.

Union density and human capital allocation

Industrial relations scholars argue that unions play a crucial role in balancing employer and employee interests (Osterman, 2011). While unions can facilitate cooperation

(Bélanger & Edwards, 2007), they primarily protect employee interests because of power imbalances. Empirical evidence shows that unionised firms tend to exhibit more collective bargaining, employee-oriented practices and industrial actions compared to non-unionised counterparts (Benson, 2000), suggesting that unions influence HR and employment systems.

Early ILM theorists proposed that unions help shape employment arrangements to protect workers from managerial abuse (Bélanger & Edwards, 2007). Osterman's (2011) institutional view reinforces this, portraying unions as advocates for member welfare. Recent studies show that strong unions can improve pay and working conditions for vulnerable workers (Refslund, 2021). Thus, organisations with higher union density are more likely to ensure equitable treatment for all workers (Cristiani & Peiró, 2015), potentially reducing HR differentiation that favours certain employees over others:

H4a: The variability in human capital strategic value will be weaker in establishments with higher levels of union density compared to those with lower union density.

H4b: The variability in human capital uniqueness will be weaker in establishments with higher levels of union density compared to those with lower union density.

Management-employee cooperation and human capital allocation

Previous ILM research has explored outcomes like cooperation, conflict and negotiation (Edwards et al., 2006). Cooperation is particularly critical in reducing conflict and fostering harmonious employment relationships (Bacon & Blyton, 1999; Bray et al., 2020). High levels of cooperation between management and employees are linked to a joint commitment to common goals (Deery & Iverson, 2005). Social exchange theories further affirm that employees tend to reciprocate the benefits provided by the organisation (Blau, 1964), further enhancing collaboration and interdependence (Deery & Iverson, 2005).

Aligned with Osterman's (2011) assertion that ILM outcomes influence HR practices, it is anticipated that increased cooperation between management and employees will result in greater investments in employee skills and competencies. Cooperation fosters open communication and knowledge sharing, enabling employees to learn from one another and enhance their skill sets. Based on these insights, I posit:

H5a: The variability in human capital strategic value will be greater in establishments with higher levels of management-employee cooperation compared to those with lower levels.

H5b: The variability in human capital uniqueness will be greater in establishments with higher levels of management-employee cooperation compared to those with lower levels.

Environmental dynamism and human capital allocation

Businesses are encountering increasingly turbulent and unpredictable environments (Troise et al., 2022). Consequently, they are actively exploring innovative approaches to foster highly flexible (Kalleberg, 2001) and agile (Atkinson et al., 2022) employees. The dynamic business landscape makes it difficult for companies to anticipate specific employee tasks and roles (Lepak et al., 2003).

According to the flexible-firm theorists, adaptable employees are essential in unpredictable settings (Eyamu et al., 2023; Kalleberg, 2001). Katou's (2021) study supports this, showing that environmental dynamism positively influences human capital management practices.

Lepak and Snell (1999) proposed that the value and uniqueness of human capital evolve with competitive conditions, necessitating the strategic movement of employees to Quadrant 1 (high strategic value and uniqueness). Thus, it is suggested:

H6a: The variability in human capital strategic value will be greater in establishments with higher levels of environmental dynamism compared to those with lower levels.

H6b: The variability in human capital uniqueness will be greater in establishments with higher levels of environmental dynamism compared to those with lower levels.

Technological opportunities and human capital allocation

Prior studies have highlighted the critical influence of technology in shaping optimal HR configurations (Kintana et al., 2006). Advanced technologies demand a highly skilled workforce, particularly those in knowledge-intensive roles (Vrontis et al., 2022).

Unlike technological uncertainty, which creates unpredictability (Garcia-Buendia et al., 2023), technological opportunities provide avenues for firms to improve performance. Research suggests that technological opportunities significantly impact the types of human capital and HR systems adopted by firms, prompting them to invest in roles that support innovation and knowledge creation (Capozza & Divella, 2019).

Zhang-Zhang et al. (2022) theorised that companies facing environmental dynamism and technological opportunities should invest more in their knowledge workers. Thus, companies with more substantial technological opportunities are more inclined to develop their employees' skill sets and capabilities to capitalise on business opportunities (Capozza & Divella, 2019), driving up both the value and uniqueness of their human capital:

H7a: The variability in human capital strategic value will be greater in establishments with higher levels of technological opportunities compared to those with lower levels.

H7b: The variability in human capital uniqueness will be greater in establishments with higher levels of technological opportunities compared to those with lower levels.

Methodology

Sample and procedures

The study investigated contextual factors influencing a firm's HR architecture using data from a telephone survey. A sample of 1200 medium and large establishments (MLEs) was selected through a simple random sampling procedure from an Australian manufacturing businesses data file provided by Dunn & Bradstreet, Australia. Medium firms employ 20–199 people, while large firms have 200 or more (Australian Bureau of Statistics [ABS], 2002). This focus on MLEs eliminated very small firms with less formal HR procedures (Lepak et al., 2003).

The sample was restricted to senior executives (CEOs, HR Directors, Managers, and/or Operations Managers) to ensure participants knew human capital characteristics and employment arrangements, as supported by prior research (Lepak & Snell, 2002; Lepak et al., 2007).

The unit of analysis was the establishment, not the parent company, to reduce variability in business (Lepak et al., 2007) and ensure more reliable HR data (Takeuchi et al., 2009). Respondents answered questions about a single employment arrangement – either the one with the most employees or the one they knew best when multiple arrangements were present.

The study returned 200 surveys out of the 1200 invitations sent, yielding a 16.7% response rate – consistent with similar research (e.g., Lepak & Snell, 2002; Lepak et al., 2003, 2007). Among the respondents, 50 described knowledge-based, 144 job-based and 6 contractual employment arrangements. The establishment size was 1216 employees and the mean age was 5.9 years.

Non-response bias

Consistent with Lineback and Thompson (2010), revenue was used as a proxy variable to assess non-response bias, as it was available for both responding and non-responding establishments. Specifically, the researcher conducted a one-way ANOVA to compare revenue between responding and non-responding establishments (Eyamu, 2019). Data on revenue were obtained post-survey from the same Australian manufacturing business database. The analysis included 2300 cases (200 respondents; 2100 non-respondents). Results revealed no significant revenue difference at the 0.05 level between respondents (M = 3.96) and non-respondents (M = 3.82), $F(1, 2298) = 1.60$, $p > 0.21$.

Additionally, using four-digit Australian Standard Industrial Classification (SIC) codes, a Chi-squared test assessed industry-level differences, in line with Lepak and Snell (2002). The test showed no significant association between response status and industry type; $\chi^2(326; N = 2300) = 219.23$; $p > 1.00$. These findings confirm the sample's representativeness of the population.

Measures

To bolster survey validity, all survey items were selected from measures previously used in other studies. Multi-item measures with 5-point Likert-type anchors were employed for all variables, except employment arrangements and union density.

Eyamu (2019) defined employment arrangements as follows:

- Knowledge-based roles involve developing employees' expertise over time to meet the organisation's long-term strategic needs.
- Task-based roles focus on hiring employees for defined duties tied to short-term performance goals in goods or service production.
- Support-staff roles encompass routine, narrowly defined jobs that are not central to core production activities.
- Alliances refer to collaborative arrangements with external parties or subcontractors (e.g., temp agencies) to complete specific projects or functions.

Participants specified the percentage of their employees in each arrangement and identified at least three positions typically filled within the arrangement with the largest share of workers. Table 1 presents the job sample. Consistent with the observations of Lepak and Snell (2002) and Lepak et al. (2007), certain positions were identified under multiple employment arrangements, confirming the notion that firms may allocate similar positions through different employment systems.

Human capital strategic value was measured using a five-item scale developed by Cabello-Medina et al. (2011). Respondents were tasked with indicating their disagreement or agreement with statements about the knowledge, skills and expertise of employees within the employment arrangement that either employed the most people or with which they were most familiar. An illustrative item was: 'Employees in the [selected] employment arrangement have skills that create customer value'.

Human capital uniqueness was evaluated with four items utilised by Cabello-Medina et al. (2011). These items measured the extent to which the skills held by employees in the focal employment arrangement was specialised or difficult for competitors to replicate. For instance,

TABLE 1: Job sample.

Knowledge-based roles	Task-based roles	Support-staff roles
Managers	Professionals	Clerical staff
Professionals	Sales workers	Administrative workers
Sales workers	Machinery operators	Labourers
Machinery operators	Technicians	Community workers
Technicians	Trade workers	Personal service workers
Trade workers	Managers	-
-	Drivers	-
-	Labourers	-

Source: Eyamu, S. (2019). *Antecedents and consequences of human resource differentiation*. Unpublished doctoral dissertation, University of Melbourne, p. 73

'Employees in the [selected] employment arrangement have skills that are not available to our competitors'.

Cost leadership strategy was measured using a three-item scale developed by Wang and Verma (2012), including 'reducing labour costs', 'using part-time, temporary or contract workers' and 'minimising production and service delivery costs'.

Differentiation strategy was evaluated through four items aligned with prior studies (e.g., Lepak et al., 2007; Wang & Verma, 2012). An example was: 'undertaking research and development'.

Management-employee cooperation was assessed through 10 items adapted from Deery and Iverson (2005) and Dastmalchian et al. (1989), with wording adjusted to reflect joint interaction between management and employees. For instance: 'Management and employees work together to make this organisation a better place in which to work'.

Union density was assessed through a single item measure consistent with Lepak and Snell (2002) and Wang and Verma (2012), asking 'What proportion of employees in your workplace are members of a union?' Respondents used a 5-point scale, with options ranging from 1 (20% or less) to 5 (81% – 100%).

Environmental dynamism was measured using a five-item scale from Jansen et al. (2009), with items such as: 'business changes in your local market are intense'.

Technological opportunities were evaluated using four items consistent with Eddleston et al. (2008). One such statement is: 'opportunities for product innovation are abundant in your major industry'.

Control variables

To mitigate potential confounding factors, the author Eyamu (2019) considered several controls in the analysis: (1) Organisation size was measured as the natural logarithm of the number of employees at the establishment (Lepak & Snell, 2002; Takeuchi, 2009). (2) Establishment age was captured by the number of years since the business was founded (Liao et al., 2009). (3) Sector type was coded as 1 for private-sector and 2 for public-sector organisations (Zacharatos et al., 2005). (4) Alliance participation was recorded as 1 for establishments involved in alliances and 0 for those not involved (Schilke, 2014). (5) Ownership structure was included to distinguish between Australian-owned and foreign-owned entities, acknowledging possible variations in HR management across domestic and international operations.

Common method variance

To minimise the risk of common method variance (CMV), both procedural and statistical measures were used. Firstly, I carefully designed the study and survey administration, rewording certain measurement items to enhance clarity and minimise ambiguity. Specifically, the terms job-based and contractual employment arrangements were rephrased as task-based and support-staff roles, respectively. Additionally, I chose a telephone survey methodology, as suggested by Podsakoff et al. (2003), to improve item clarity and reduce ambiguity.

Secondly, I used shortened versions of the scales to measure human capital characteristics (Cf. Cabello-Medina et al., 2011). Hinkin (1995) suggests that concise survey instruments can mitigate bias arising from respondent carelessness or fatigue.

Thirdly, the data were collected from senior executives (e.g., HR managers, CEOs, operations managers), who were assumed to possess detailed knowledge of their firm's employment practices. This improved the likelihood of obtaining informed and credible responses.

Statistical techniques were also applied to assess CMV. Harman's single-factor test was conducted using principal component analysis (PCA), where all seven latent constructs were loaded with a constraint of one factor (Podsakoff et al., 2003; Schilke, 2014). The analysis yielded a total variance explained of 22.71%, below the threshold commonly associated with CMV concerns. Moreover, a confirmatory factor analysis (CFA) was conducted to compare the fit of a single-factor model against the proposed seven-factor model (McFarlin & Sweeney, 1992). The results indicated poor fit for the single-factor model: $\chi^2(377) = 1852.590$, $p < 0.001$, standardised root mean residual (SRMR) = 0.14, Tucker-Lewis index (TLI) = 0.3, incremental fit index (IFI) = 0.38; comparative fit index (CFI) = 0.37, root mean square error of approximation (RMSEA) = 0.14. These fit indices support the conclusion that CMV does not pose a significant threat to the integrity of the data.

Reliability and validity checks

To ensure measurement quality, the reliability and validity of all latent constructs were rigorously examined. Exploratory factor analysis (EFA) was first conducted to check for cross-loading items, followed by reliability testing using Cronbach's alpha (α). All scales achieved acceptable internal consistency, with α values ranging from 0.75 to 0.88, surpassing the 0.70 benchmark recommended by Hair et al. (2014a).

Convergent and discriminant validity were also assessed. Composite reliability (CR) and average variance extracted (AVE) were calculated for each scale. As suggested by Hair et al. (2014a), CR values above 0.70 and AVE scores exceeding 0.50 are indicative of adequate convergent validity. All constructs met these criteria.

Discriminant validity was verified using the Fornell-Larcker criterion (Fornell & Larcker, 1981; Hair et al., 2014b). The

AVE for each construct was greater than the squared correlations with other constructs, supporting distinctiveness among the measures. These results, summarised in Table 2, confirm that the measurement model is both reliable and valid.

Data analysis strategy

I further examined the measurement model's robustness and distinctiveness through CFA. As per Bentler's (1990) guidelines, a well-fitting model should exhibit TLI, IFI and CFI values exceeding 0.9. Additionally, for the SRMR and the RMSEA, values below 0.08 were considered indicative of a favourable model fit.

To analyse the hypotheses, I employed ANOVA and ANCOVA. However, for H1 and H2, independent samples *t* tests were also conducted to compare the levels of strategic value and uniqueness of human capital across different employment arrangements.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Melbourne Business and Economics Human Ethics Advisory Group (No. 1545154.1). Participation was voluntary, confidential and anonymous.

Results

Measurement model

Results from the CFA indicated a good model fit: χ^2 (356) = 553.498, $p < 0.001$, SRMR = 0.06, TLI = 0.90, IFI = 0.92, CFI = 0.92 and RMSEA = 0.05. These indices support the distinctiveness and adequacy of the measurement model.

Descriptive statistics

Based on the results from CFA, composite scores for each latent construct were computed. Bivariate correlations are presented in Table 3. The mean score for human capital value was 3.79, while that of human capital uniqueness was 2.67. Human capital value showed a positive correlation with human capital uniqueness (r = 0.38**, $p < 0.01$). Furthermore, knowledge-based employment was positively correlated with both human capital value (r = 0.39**, $p < 0.01$) and uniqueness (r = 0.21**, $p < 0.01$), consistent with the hypotheses.

Tests of main effects (H1 and H2)

H1 predicted that human capital with high strategic value would be assigned to knowledge-based and job-based positions, while human capital with lower strategic value would be directed towards contract work and alliances. The ANCOVA results, summarised in Table 4, indicated significant differences in strategic value across employment arrangements (F = 20.01, $p < 0.001$). An independent samples t test revealed a significant difference between knowledge-based and support-staff roles (Mdifference = 0.52, $t = 2.72$, $p < 0.01$). However, contrary to the hypothesis, a significant difference was also found between knowledge-based and task-based roles (Mdifference = 0.81; t = 7.33; $p < 0.001$). However, no significant difference emerged between task-based and support-staff roles (Mdifference = −0.30; t = −0.96; $p > 0.34$). These findings offer partial support for H1.

H2 posited that human capital with a higher degree of uniqueness would be directed towards alliances and knowledge-based roles, while lower uniqueness would be associated with contract and job-based roles. The ANCOVA results presented in Table 4 showed significant differences in means for human capital uniqueness (F = 5.35, $p < 0.01$). Knowledge-based roles exhibited the highest mean uniqueness, followed by support-staff roles, and the lowest in task-based roles. As hypothesised, the *t* test revealed significant differences between knowledge-based and task-based roles (Mdifference = 0.53; t = 3.41, $p < 0.001$); and no significant difference between task-based and support-staff roles (Mdifference = −0.36; t = −0.95, $p > 0.35$). However, the difference between knowledge-based and support-staff roles was not significant (Mdifference = 0.17, t = 0.39, $p > 0.70$), providing partial support for H2.

Hypotheses 3a and 3b tests

To examine whether establishments pursuing a differentiation strategy allocate more strategically valuable and unique human capital than those focused on cost leadership (H3a and H3b), a two-way factorial ANOVA was conducted using a median split approach. Results showed that the differentiation strategy was significantly associated with higher levels of human capital strategic value (F[1, 190] = 10.30, $p < 0.01$) and uniqueness (F[1, 191] = 13.81, $p < 0.001$). In contrast, cost leadership strategy did not significantly affect human capital strategic value (F[1, 190] = 0.09, $p > 0.77$) or uniqueness (F[1, 191]= 0.47, $p > 0.49$). Effect size estimates (η^2) showed that 5.1% and 6.7% of the variance in human capital strategic value and uniqueness respectively, were explained by differentiation strategy. This suggests that differentiation strategy significantly influences human capital strategic value and uniqueness compared to cost leadership strategy, thereby confirming support for H3a and H3b.

TABLE 2: Discriminant validity analysis (N = 200).

No.	Variable	1	2	3	4	5	6	7
1	Value	**0.54**	-	-	-	-	-	-
2	Uniqueness	0.15	**0.65**	-	-	-	-	-
3	Employee-management cooperation	0.03	0.04	**0.56**	-	-	-	-
4	Technological opportunities	0.08	0.09	0.04	**0.59**	-	-	-
5	Differentiation strategy	0.08	0.05	0.08	0.16	**0.53**	-	-
6	Cost leadership strategy	0.01	0.00	0.00	0.00	0.06	**0.75**	-
7	Environmental dynamism	0.02	0.01	0.04	0.11	0.19	0.04	**0.53**

Source: Eyamu, S. (2019). *Antecedents and consequences of human resource differentiation*. Unpublished doctoral dissertation, University of Melbourne, p. 86

Note: Bold values along the diagonal represent the average variance extracted, while the values beneath the diagonal indicate the squared correlations between constructs.

TABLE 3: Descriptive statistics and correlations among study variables ($N = 200$).

No.	Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Ln (Est†. size)	4.34	1.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Est†. Age	5.99	1.51	0.25**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Alliances	0.70	0.46	0.23**	-0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	Private or public	1.08	0.26	0.14	-0.01	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Aus or for‡	2.07	1.71	0.42**	0.13	0.22**	0.18*	-	-	-	-	-	-	-	-	-	-	-	-
6	Strategic value	3.79	0.76	-0.07	-0.03	-0.02	0.06	0.04	-	-	-	-	-	-	-	-	-	-	-
7	Uniqueness	2.67	0.97	-0.12	-0.14*	-0.04	-0.01	0.00	0.38**	-	-	-	-	-	-	-	-	-	-
8	Union density	2.09	1.26	0.30**	-0.13	0.17	0.13	0.11	-0.21	0.03	-	-	-	-	-	-	-	-	-
9	Mgt-em coop§	4.18	0.46	-0.15*	-0.13	0.01	0.02	0.00	0.18*	0.21**	-0.09	-	-	-	-	-	-	-	-
10	Tech. opp'tunities¶	3.07	0.90	0.16*	-0.06	0.08	0.08	0.12	0.28**	0.30**	-0.04	0.20**	-	-	-	-	-	-	-
11	Differentiation	3.77	0.94	0.00	0.02	-0.04	0.11	-0.05	0.29**	0.23**	-0.38**	0.28**	0.40**	-	-	-	-	-	-
12	Cost leadership	3.73	0.91	0.13	0.02	0.09	0.03	0.04	0.09	0.04	0.10	0.03	0.05	0.24**	-	-	-	-	-
13	Dynamism	2.41	0.83	-0.12	-0.07	0.02	-0.10	0.00	-0.15*	-0.11	0.10	-0.19**	-0.34**	-0.44**	-0.21**	-	-	-	-
14	Knowledge emp††	1.88	1.12	-0.10	0.02	0.01	0.05	0.13	0.39**	0.21**	-0.17	0.06	0.25**	0.17*	-0.05	-0.18*	-	-	-
15	Task-based emp††	3.20	1.21	0.05	-0.02	0.02	0.03	-0.15*	-0.30**	-0.18*	0.32**	-0.15*	-0.25**	-0.24**	-0.02	0.15*	-0.57**	-	-
16	Support-staff emp††	1.17	0.61	0.00	0.00	-0.07	0.02	0.08	0.01	0.01	-0.11	0.02	0.02	0.11	-0.06	-0.07	-0.02	-0.30**	-

Source: Eyamu, S. (2019). *Antecedents and consequences of human resource differentiation*. Unpublished doctoral dissertation, University of Melbourne, p. 88

*, $p < 0.05$; **, $p < 0.01$.

†, Est., establishment; ‡, Aus or for, Australian or Foreign; §, Mgt-ep coop, management-employee cooperation; ¶, Tech. opp'tunities, technological opportunities; ††, Emp, employment arrangement.

Hypotheses 4a to 7b tests

To analyse the effect of contextual factors on a firm's HR architecture, Lepak et al.'s (2007) median split approach was utilised, categorising union density, management-employee cooperation, environmental dynamism and technological opportunities. The results are outlined in Table 5.

For union density, the ANCOVA results indicated a significantly lower strategic value of human capital in establishments with higher union density ($F = 5.55$, $p < 0.05$), confirming H4a. However, while uniqueness was lower in high union density settings, the difference was not statistically significant ($F = 0.04$, $p > 0.85$), contrary to H4b.

Concerning management-employee cooperation, establishments with higher levels of cooperation exhibited marginally higher strategic value of human capital ($F = 3.29$, $p < 0.10$) and significantly greater uniqueness ($F = 7.25$, $p < 0.01$). These results partially support H5a (at $p < 0.10$) and confirm H5b.

Intriguingly, while the strategic value and uniqueness of human capital were higher in more dynamic environments, these differences were not statistically significant (strategic value: $F = 2.23$, $p > 0.13$; uniqueness: $F = 1.15$, $p > 0.29$). Thus, H6a and H6b are not supported.

Last but not least, establishments reporting greater technological opportunities had significantly higher levels of both strategic value ($F = 10.69$, $p < 0.001$) and uniqueness ($F = 14.10$, $p < 0.001$) of human capital. These findings provide strong support for H7a and H7b.

Additional analyses

I consolidated support and task-based roles into a single category termed 'less knowledge-intensive' employment, and conducted ANOVA to compare this with knowledge-based roles on human capital strategic value and uniqueness. Results showed that knowledge-based roles had significantly higher strategic value ($M = 4.39$) than less knowledge-intensive roles ($M = 3.59$, $F = 52.54$, $p < 0.001$). Similarly, knowledge-based roles also scored higher on uniqueness ($M = 3.06$) compared to less knowledge-intensive roles ($M = 2.54$, $F = 11.14$, $p < 0.001$).

Discussion

This study aimed to examine the contextual factors shaping an organisation's HR architecture. It initially sought to validate the HR architecture framework by investigating differences in human capital characteristics across different employment arrangements. Subsequently, it explored how contextual factors like firm strategy, union density, management-employee cooperation, environmental dynamism and technological opportunities influence variations in human capital characteristics.

TABLE 4: Human capital characteristics under the three employment arrangements.

Human capital	Control variables† ANCOVA *F*	Knowledge-based roles			Task-based roles			Support-staff roles			R^2 for the overall model
		Mean	SD	*N*	Mean	SD	*N*	Mean	SD	*N*	
Value	20.01	4.39	0.40	50	3.58	0.75	143	3.88	0.70	6	0.22***
Uniqueness	5.35	3.06	1.02	50	2.52	0.93	144	2.89	0.89	6	0.08**

Source: Eyamu, S. (2019). *Antecedents and consequences of human resource differentiation*. Unpublished doctoral dissertation, University of Melbourne, p. 89

SD, standard deviation.

*, $p < 0.05$; **, $p < 0.01$.

†, Controlling for establishment size (ln), age, public or private, alliances and whether the establishment is Australian or foreign-owned.

TABLE 5: Analysis of covariance results of the study.

Description‡	Strategic value of jobs							Uniqueness of jobs						
	High			Low			*F*-Values	High			Low			*F*-Values
	Mean	SD	*N*	Mean	SD	*N*		Mean	SD	*N*	Mean	SD	*N*	
Union density	3.41	0.67	28	3.81	0.69	58	5.55*	2.49	0.81	28	2.54	0.89	59	0.04
Mgt-employee cooperation	3.93	0.75	81	3.70	0.75	118	3.29†	2.91	1.12	82	2.50	0.82	118	7.25**
Environmental dynamism	3.71	0.78	100	3.87	0.74	99	2.23	2.61	0.96	100	2.72	0.99	100	1.15
Technological opportunities	3.96	0.72	96	3.63	0.76	103	10.69***	2.90	1.04	97	2.45	0.85	103	14.10***

Source: Eyamu, S. (2019). *Antecedents and consequences of human resource differentiation*. Unpublished doctoral dissertation, University of Melbourne, p. 97

SD, standard deviation; Mgt, management.

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$; †, $p < 0.10$.

‡, Controlling for establishment size (ln); age; public or private; alliances; and whether the establishment is Australian or foreign-owned.

In line with Lepak and Snell (2002), the results indicate that employment arrangements differ depending on the associated human capital characteristics. Knowledge-based roles consistently demonstrated higher strategic value and uniqueness. Surprisingly, job-based employment was associated with significantly lower human capital strategic value compared to knowledge-based arrangements, with no significant difference from contractual roles. This suggests Australian manufacturing firms differentiate core knowledge roles from job-based roles, supported by a strong negative correlation between knowledge-based and task-based roles ($r = –0.93$**, $p < 0.01$).

The study also shows that an organisation's strategy affects human capital characteristics. Specifically, manufacturing firms that prioritise differentiation tend to have more unique and valuable human capital than those that prioritise cost reduction. This aligns with the job-based model, suggesting that a firm's competitive strategy determines the strategic importance of different roles (Becker & Huselid, 2006). Additionally, the research reveals that a higher union density mitigates disparities in human capital value, reflecting the influence of unions on workplace practices and collective bargaining agreements (Cristiani & Peiró, 2015).

Moreover, workplaces with greater management-employee cooperation exhibited strategically valuable and unique human capital, indicating a preference for knowledge roles in such collaborative environments. This finding corroborates earlier studies in the field of industrial and employee relations (Deery & Iverson, 2005; Bray et al., 2020).

Similarly, technological opportunities were found to significantly influence human capital characteristics. This suggests that workplaces exposed to more technological opportunities are more likely to invest in knowledge roles to generate innovative capabilities (Eddleston et al., 2008). However, environmental dynamism did not significantly influence human capital characteristics. Nonetheless, this should not be interpreted to mean that firms are static. Rather, the findings highlight how intricately organisations respond to changing environments. Some may pursue short-term flexibility strategies, while others adjust gradually through incremental HR reconfigurations. Thus, while certain contextual factors like technological shifts prompt immediate HR investments, others, such as environmental uncertainty, may elicit adaptive responses over time that are not always linear or measurable in cross-sectional analyses.

Theoretical implications

The study challenges the assumption that human capital in knowledge-based and job-based roles always holds more strategic value than that in contractual arrangements (Lepak & Snell, 1999, 2002). Firstly, the findings reveal that organisations may draw sharper distinctions between core knowledge roles and others, pointing to a more deliberate use of employment arrangements to achieve competitive advantage.

Secondly, the findings imply that the HR architecture and job-based models are complementary. While the job-based model links differentiation to strategic capabilities contained within jobs (Becker & Huselid, 2006), the HR architecture emphasises the strategic value and uniqueness of human capital for differentiation (Lepak & Snell, 2002). This implies that determining a firm's competitive strategy should be the starting point for differentiation (Lepak et al., 2007; Tavalaei & Santalo, 2019). Also, the realisation that differentiation-focused enterprises tend to have more unique and valuable human capital than cost leadership firms can guide strategic decision-making in organisations.

Thirdly, the findings corroborate the notion that businesses function in dynamic contexts in which contextual factors change. Therefore, employment systems should not be viewed as static templates but as flexible architectures that adapt over time. It also lends support to the notion that HR configurations are part of an ongoing strategic alignment process, responsive to both internal capabilities and external pressures (Wright & Snell, 1998).

This study also emphasises that contextual factors are crucial in predicting variations in human capital characteristics. Rather than categorising certain employment arrangements as inherently superior, the study suggests that firms should tailor their employment systems based on the specific contextual factors they face. For instance, the role of unions (Barth et al., 2020) and management and employee cooperation (De Prins et al., 2020) can significantly influence human capital allocation, highlighting the need for adaptive and context-specific HR systems (Cooke et al., 2021).

Practical implications

The study's findings emphasise the significance of context-specific decision-making in HR and employment systems, providing crucial insights for managers. Specifically, managers are advised to exercise caution when imitating or benchmarking HR and employment systems from other firms. By carefully analysing their organisation's competitive strategy, managers and HR specialists are encouraged to determine whether a function is strategic or non-strategic (Huselid & Becker, 2011). This approach enables the creation of value-driven organisational architectures customised to the organisational needs and goals.

More importantly, although human capital attributes influence the choice of employment arrangements, comprehending the circumstances under which firms distinguish their workforce is equally vital. For example, the positive association between higher levels of management-employee cooperation and strategically valuable and unique human capital emphasises the importance of collaborative workplace interactions. Thus, organisations seeking to enhance their human capital may explore strategies that foster cooperation between management and employees. Similarly, organisations exposed to technological opportunities are more likely to invest in knowledge roles to enhance their human capital characteristics.

Finally, this study encourages managers to view HR architecture as a flexible framework that evolves with changing conditions. As firms face increasing external complexity and uncertainty, their employment systems must be designed not just for current alignment but also for adaptive capacity. Therefore, firms need to reconfigure their workforce in response to emerging challenges and opportunities.

Limitations and future research directions

The study, while contributing valuable insights, has some limitations. Firstly, the uneven distribution of participants across different employment arrangements raises concerns about the study's statistical power. The small sample size for support-staff employment arrangements is acknowledged as being insufficient for robust analysis. Future research in the manufacturing sector should aim for more balanced representation across various employment arrangements to enhance the generalisability of results.

Secondly, the exclusion of alliances because of the absence of information regarding human capital attributes is a limitation. This omission restricts the study's comprehensiveness and opens the door for more research in industries where partnerships are more integral to business operations, to test the full applicability of the HR architecture framework.

Thirdly, data collection from a single respondent for each establishment introduces the possibility of single-source bias. Despite efforts to minimise the potential for CMV, future research could mitigate this by incorporating multiple data sources from each establishment, enhancing the robustness and reliability of the findings.

Finally, the study focused on key contextual factors outlined by ILM theory, the flexible-firm model and the job-based model. However, this limited scope does not reflect the full spectrum of contingencies influencing human capital characteristics. Future research, inspired by the Contingency Theory (Jackson & Schuler, 1995), could explore additional contextual factors to gain a more complete picture of the complexities in HR architecture.

Conclusion

While the HR architecture framework highlights the need to tailor HR systems to match human capital strategic importance and distinctiveness (Lepak & Snell, 2002; Luo et al., 2021), it falls short of fully accounting for the influence of contextual factors on these dynamics. This study fills this knowledge gap by underscoring the evolving nature of HRM and the importance of incorporating contextual factors into the development of HR systems. The findings demonstrate that human capital's strategic value and uniqueness can vary significantly depending on factors such as differentiation strategy, employee-management collaboration and technological opportunities. This reinforces the view that HR systems should not be seen as static prescriptions but as adaptive configurations that evolve alongside organisational priorities and external pressures. Therefore, organisations are encouraged to adopt a flexible and adaptive approach, continually aligning workforce strategies with the changing circumstances of technological change, labour relations and market demands, among others.

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