

Driving Innovation and Competitive Advantage through Human Resource Management, Culture, Technology, and Employee Commitment

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Abstract

Purpose: This study examines how organisational culture, employee commitment and Human Resource Management (HRM) practices jointly influence innovation and competitive advantage.

Research Methodology: A quantitative survey design was adopted, and data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to test direct and indirect relationships among human resource management, culture, technology, and employee commitment on innovation and competitive advantage.

Results: Results reveal that culture significantly affects HRM practices, innovation and competitive advantage, HRM practices are strong predictors of both innovation and competitive advantage, employee commitment has a direct effect on competitive advantage but not on HRM or innovation, and HRM mediates the relationship between culture and both innovation and competitive advantage, but not for employee commitment.

Conclusions: The findings indicate that culture and HRM form the core mechanisms driving innovation capability and competitive outcomes, while employee commitment plays a more limited role unless embedded in a strong cultural-HRM system.

Limitations: This study uses a cross-sectional design and self-reported data, which may limit causal interpretation and generalizability.

Contributions: The study contributes to theory by clarifying the mechanism through which culture converts into performance via HRM and innovation. It offers practical guidance for aligning culture, HRM practices and innovation strategy.

Keywords: *Competitive, Employee Commitment, Human Resource Management (HRM), Innovation, Organisational Culture*

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1. Introduction

In today's rapidly evolving global economy, manufacturing firms are confronted with intensifying competition, accelerated technological change, and shifting customer demands. The manufacturing sector no longer competes merely on cost or scale, but increasingly on innovation, speed to market, flexibility, and the ability to continuously improve. In this environment, sustaining a competitive advantage requires more than investment in machines or production capacity. It demands a workforce that is engaged, adaptive, and capable of generating new ideas as well as implementing process and product improvements.

In the manufacturing context specifically, Human Resource Management (HRM) practices have emerged as a strategic lever for enhancing organizational performance. Research shows that HRM practices such as recruitment and selection of capable employees, training and development, performance appraisal, rewards and compensation, and empowerment are positively linked to better production performance and innovation outcomes in manufacturing settings. For example, a study of the Malaysian manufacturing industry found that strategic HRM practices significantly improved production performance by enhancing employees' skills and motivation. Another investigation into Asian organizations revealed that the combination of employee development oriented Human Resource (HR) practices and innovation-led competitive priorities yields sustainable manufacturing performance.

At the same time, the role of organizational culture cannot be understated in manufacturing firms. A culture that supports continuous learning, experimentation, employee involvement, and change readiness enables organizations to harness the potential of their workforce for innovation. In manufacturing environments where processes, workflows, and technologies evolve organizational culture that stimulates employee initiative and knowledge sharing becomes a crucial enabler for innovation and competitive advantage.

Moreover, in the era of Industry 4.0 characterized by digitalization, automation, data analytics and smart manufacturing technologies the role of HR technology becomes more salient. Manufacturing firms are adopting Human Resource Information Systems (HRIS), talent analytics, e-HRM, and other digital tools to streamline HR processes, improve workforce planning, and support employee development in new skill domains. The adoption of these HR technologies in manufacturing enables HR to shift from administrative to strategic roles and supports alignment of HR practices with broader organizational goals of agility and innovation.

Despite these advances, many manufacturing organizations struggle to translate HRM practices, supportive culture and HR technology into tangible outcomes such as employee innovation and competitive advantage. The underlying mechanisms remain underexplored. For instance, while HRM practices may enhance employees' skills and motivation, their effect on innovation may be mediated by other factors such as organizational learning (the firm's capacity to create, share, and apply knowledge) and employee commitment (the degree to which employees feel psychologically attached and dedicated to the organization). Research suggests that HRM practices influence innovation via intervening variables like knowledge sharing and employee behaviors rather than directly.

In manufacturing firms where innovation may happen at the level of process improvements, equipment upgrades, product redesigns or production workflow innovations, the ability of employees to learn, to share knowledge and to commit to organizational goals is critical. When employees are well trained, supported by a culture of innovation and equipped with digital HR tools, they are more inclined to engage in innovative work behaviours, contribute new ideas, and help the firm achieve competitive advantage. Yet, the empirical evidence specifically focusing on how HRM practices, culture and HR technology simultaneously influence employee innovation and competitive advantage in manufacturing firms with organizational learning and employee commitment as mediators remains limited. The research gaps in this study are shown in Table 1 below:

Table 1. Research gap mapping

No.	Research Focus	Previous Studies Findings	Identified Research Gap	Contribution of This Study
1	HRM Practices → Employee Innovation / Firm Innovation	Studies indicate that HRM practices (training, selection, and compensation) positively influence innovation (product, process, and marketing) in various contexts.	Many studies have been conducted in service sectors, Small and Medium-sized Enterprises (SMEs) or non-manufacturing contexts. Few focus specifically on manufacturing firms, especially heavy/advanced manufacturing, and on employee innovation (rather than just product/process) and competitive advantage.	This study will fill the gap by focusing on manufacturing firms, measuring employee innovation (rather than only firm-level patents) and linking HRM practices to competitive advantage in this context.
2	Organizational Culture → Employee Innovation / Competitive Advantage	Research connects organizational culture and innovation, showing that culture supportive of innovation correlates with higher innovation performance.	There is a lack of studies examining the mechanism between organizational culture and innovation in manufacturing, particularly mediated by variables such as organizational learning or employee commitment. Furthermore, direct links to competitive advantage are under-examined.	The study will explore how culture in manufacturing firms facilitates organizational learning and employee commitment, which in turn drives employee innovation and competitive advantage.
3	HR Technology / Digital HRM → Innovation / Competitive Advantage	The era of digitalization (Industry 4.0) shows manufacturing firms increasingly adopt HR technology, but empirical research on HR technology as an independent variable in manufacturing, and how it influences innovation and competitive advantage, remains scarce.	Very few empirical studies incorporate HR technology (HRIS, digital and talent management) in manufacturing as an independent variable, and even fewer examine its pathway via mediators such as organizational learning or employee commitment.	This study will incorporate HR technology as a variable in manufacturing firms and test its direct and mediated effects on employee innovation and competitive advantage through organizational learning and employee commitment.
4	Mediation Mechanisms (Organizational Learning & Employee Commitment)	Some studies have examined mediators (knowledge sharing and human capital) between HRM and innovation/performance.	There is a lack of research explicitly using organizational learning and employee commitment as mediators in the full model, such as HRM practices, culture, HR technology → employee innovation → competitive advantage especially in manufacturing firms.	The current study proposes an integrative mediation model in manufacturing context, such as HRM practices, culture, and HR technology influence employee innovation and competitive advantage via organizational learning and employee commitment.

No.	Research Focus	Previous Studies Findings	Identified Research Gap	Contribution of This Study
5	Competitive Advantage as Outcome	Many studies focus on innovation outcomes or general performance, fewer link innovation at the employee level to competitive advantage of the firm directly.	There is a research void in examining the full pathway from HRM, culture, and HR technology through employee innovation to competitive advantage in manufacturing firms.	The study will fill this gap by treating competitive advantage as the second dependent variable, thereby linking employee innovation outcomes to firm-level competitive advantage in manufacturing.

Therefore, this research seeks to fill the gap by analysing how HRM practices, organizational culture, and HR technology affect employee innovation in manufacturing firms, how employee innovation in turn contributes to the firm's competitive advantage, and how these relationships are mediated by organizational learning and employee commitment, it showed in Table 1. By focusing on manufacturing firms, this study responds to the pressing need for human-centred strategies in an era of technological change and competitive pressure. The findings aim to provide both theoretical contributions and practical guidance for HR managers and manufacturing leaders to align their human-resource strategies with innovation and competitive performance.

2. Literature Review and Hypotheses Development

2.1 Implication of Culture and Employee Commitment on HRM

The implications of organisational culture and employee commitment for Human Resource Management (HRM) are substantial and multifaceted. First, a strong, positive organisational culture, characterised by shared values, trust, open communication, recognition of innovation, and supportive leadership, serves as a key contextual enabler of HRM practices (Rosi & Ekasari, 2023). For instance, studies indicate that when culture emphasises trust and innovation, employees show higher levels of commitment, and HR development activities (such as training) become more effective in increasing commitment (Nurlianti et al., 2023).

For HRM, this means that simply deploying standard HR practices (recruitment, training, appraisal, reward) is not enough: such practices must be aligned with and embedded within a culture that reinforces the desired behaviours. When HRM is congruent with culture, it strengthens employees' sense of belonging and identification with the organisation, thereby boosting commitment (Yang & Mostafa, 2024). In practical terms, HR managers should assess the prevailing culture before designing HR practices, and ensure culture-HRM alignment, such as aligning reward systems with cultural values such as innovation or collaboration (Migkos, Giannakopoulos, & Sakas, 2025).

Meanwhile, employee commitment itself influences HRM by acting as both a desired outcome of HRM practices and a contributing lever for other HR outcomes such as performance, retention, innovation. When employees are committed emotionally and normatively they are more likely to engage with HRM initiatives, participate in development programmes, adopt organisational changes, and stay longer (Miftah, 2023). Conversely, HRM needs to design practices that foster commitment (such as empowerment, job involvement, development opportunities) because committed employees support the strategic goals of HRM. For example, one study found that HRM practices impacted employee performance through the mediation of affective commitment (Pamungkas & Wulandari, 2021).

H₁: Culture positively contributes to HRM

H₂: Employee Commitment positively contributes to HRM

2.2 Implication of Culture, Employee Commitment on Innovation and Competitive Advantage

An innovation-oriented culture fosters higher levels of employee commitment, which in turn drives innovative behaviour. For example, a study of South Korean firms found that an innovation-oriented organisational culture significantly increased employees' organisational commitment, which then promoted their innovative behaviour ([Ding & Hong, 2025](#)). In that study, employee commitment acted as a mediator in the culture → innovation link. Thus, HRM and leadership should build culture that signals trust, autonomy and support for creativity so that employees feel committed and engage in innovation. Culture-innovation fit matters for competitive advantage. One study of Chinese firms showed that the fit between organisational culture and innovation strategy explained large variances in innovation speed and innovation quality, and the authors argue this fit is a source of competitive advantage ([Chen et al., 2018](#)). If culture and strategy are misaligned, innovation suffers and competitive advantage is harder to sustain ([Yum & Kim, 2024](#)).

Employee commitment contributes to innovation performance, which underpins competitive advantage. A study in the hospitality industry in Iran found that organisational commitment improved knowledge acquisition and sharing and retention, which are key to innovation performance and thus competitive advantage ([Sedighi et al., 2022](#)). That is, employees committed to the organisation are more willing to share ideas, engage in experimentation, a pool of behaviours vital for innovation ([Sweeney, Payne, Frow, & Liu, 2020](#)). Culture also directly influences competitive advantage through shaping commitment and innovation. For example, research in Indonesian manufacturing found that organisational culture had significant positive effect on both organisational commitment and competitive advantage ([Kustiyadji, 2024](#)). Thus the pathway may go: culture → commitment → innovation → competitive advantage.

H₃: Culture positively contributes to Innovation

H₄: Employee Commitment positively contributes to Innovation

H₅: Culture positively impacts on Competitive Advantage

H₆: Employee Commitment positively impacts on Competitive Advantage

2.3 Implication of HRM on Innovation and Competitive Advantage

Research finds that strategic HRM practices, such as recruiting for diverse skills, training and development, performance management, employee participation and empowerment—help build an organisational climate conducive to innovation. For example, a systematic review indicates that HRM strategies focused on recruitment, training, performance management and rewards play a crucial role in fostering creativity and innovation in the workplace ([Polim, 2024](#)). In another study, HRM practices were shown to enhance organisational innovation by creating the right workforce, knowledge-sharing environment, and innovative culture ([Agha et al., 2025](#)). According to the resource-based view (RBV) of the firm, human resources, when managed effectively, become unique, inimitable assets that support competitive advantage. A bibliometric review showed that HRM systems have been studied as catalysts for innovation and capability development, which in turn support competitive advantage ([Mathushan & Gamage, 2022](#)). A specific study in Spanish industry found that HRM practices are positively associated with innovativeness, and innovativeness correlates with competitive performance (added value) for firms ([Diaz-Fernandez et al., 2023](#)).

Empirical research in SMEs shows that “innovative HRM practices” such as participation, training, compensation, flexible redeployment are significantly associated with innovation outputs (product, process, marketing innovation) and thereby better firm performance ([Aslam et al., 2023](#)). Moreover, HRM practices foster organisational innovation through human capital development and knowledge-sharing mechanisms, which in turn drive firm innovation and competitive outcomes ([Rasool et al., 2021](#)). HR practitioners should ensure that HRM is strategic (aligned with business goals), innovation-oriented (designed to foster employee idea generation, knowledge exchange, autonomy), and capability-driven (developing skills, knowledge, behaviours). HRM system bundles (rather than isolated practices) tend to be more effective in driving innovation and competitive advantage. The implication is that HRM is not just support or administrative; it is a strategic lever for building organisational capabilities that competitors cannot easily replicate.

H_7 : HRM positively impact on Innovation
 H_8 : HRM positively impact on Competitive Advantage

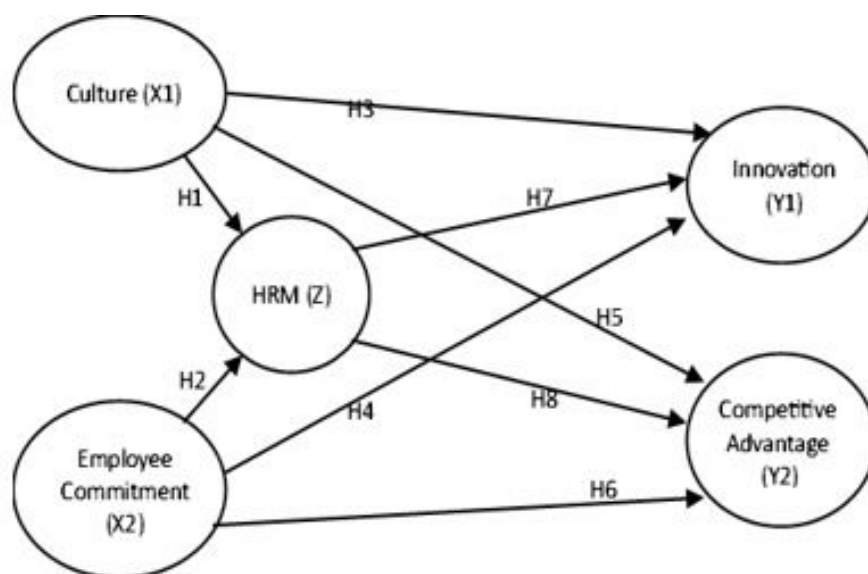


Figure 1. Conceptual framework

Figure 1 illustrates the relationships among Culture (X_1), Employee Commitment (X_2), Human Resource Management (HRM) (Z), Innovation (Y_1), and Competitive Advantage (Y_2). Culture and Employee Commitment are proposed to influence HRM, which in turn enhances Innovation and Competitive Advantage. Culture is also hypothesized to directly affect Innovation, while Employee Commitment directly influences Competitive Advantage. Furthermore, Innovation is expected to strengthen Competitive Advantage. Overall, the model examines both the direct and mediating effects of HRM on the relationships among the study variables.

3. Research Methodology

This study adopts a quantitative, cross-sectional survey design. The unit of analysis is the organisation (or alternatively individual employees within organisations, depending on access). The aim is to empirically test relationships among the constructs: HRM practices (independent variable), organisational innovation (mediator), and competitive advantage (dependent variable). A cross-sectional approach enables measurement of all variables at one point in time, and allows the use of structural equation modelling to test direct and indirect (mediated) relationships (Migal et al., 2021).

The target population comprises organisations in [specify industry/region, such as manufacturing firms in West Java, Indonesia]. Using a sampling frame (such as a business registry or industry association list), we will employ stratified random sampling based on firm size (small, medium, large). A target sample size of $n = 200$ organisations is set, which is considered adequate for PLS-SEM analysis (given rules such as “ten times the maximum number of structural paths” and considerations of power for medium effect sizes). After data cleaning (removal of incomplete responses, outliers, missing data handling), the responses will be analysed. Data will be collected via a structured questionnaire distributed online (or by paper if required) (Walter & Andersen, 2016). Respondents will be senior HR managers or senior executives familiar with HRM practices, innovation activities and firm performance. Ethical considerations (informed consent, confidentiality, anonymity) will be observed. Data analysis will be conducted using SmartPLS software, applying the Partial Least Squares Structural Equation Modelling (PLS-SEM) approach. PLS-SEM is suitable for predictive models, complex path structures, and data that may not fully satisfy normality assumptions (Samuel et al., 2021).

4. Results and Discussions

4.1 Respondent Characteristics

The demographic characteristics of respondents were analyzed to provide an overview of the participants involved in this study. The characteristics were examined based on gender, age, education level, job position and tenures in current organization. The distribution of respondent characteristics is presented in Table 2.

Table 2. Respondent characteristics

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	126	63.0
	Female	74	37.0
Age (years)	25 – 34	58	29.0
	35 – 44	70	35.0
	45 – 54	50	25.0
	55 +	22	11.0
Education Level	Bachelor degree	112	56.0
	Master degree	68	34.0
	Doctorate (PhD)	20	10.0
Job Position / Managerial Level	Top-level manager	36	18.0
	Middle manager	94	47.0
	Supervisor / staff level	70	35.0
Tenure in Current Organization	Less than 3 years	30	15.0
	3 – 7 years	82	41.0
	8 – 12 years	60	30.0
	More than 12 years	28	14.0
Firm Size (number of employees)	< 50	46	23.0
	50 – 249	92	46.0
	≥ 250	62	31.0
Industry Sector	Manufacturing	78	39.0
	Services	66	33.0
	Technology / IT	56	28.0

The sample comprised 200 respondents from various organisations in the region as shown in Table 2. The majority of respondents were male (63 %), while female respondents represented 37 %. Regarding age distribution, the largest group was 35–44 years (35 %), followed by 25–34 years (29 %), 45–54 years (25 %) and 55 years or older (11 %). In terms of education, more than half (56 %) held a Bachelor degree, 34 % a Master, and 10 % a Doctorate, indicating that the sample is relatively well-qualified. With respect to job position, 18 % of respondents were top-level managers, 47 % middle managers and 35 % supervisors or staff level, indicating a broad representation of managerial levels.

Regarding tenure in the current organisation, 15 % had been in their organisation less than 3 years, 41 % between 3 and 7 years, 30 % between 8 and 12 years and 14 % more than 12 years, showing a mix of newer and more experienced respondents. Firm size distribution indicated that 23 % of organisations were small (< 50 employees), 46 % medium (50–249 employees) and 31 % large (≥ 250 employees). Industry-wise, manufacturing firms accounted for 39 % of the sample, service firms 33 % and technology/IT firms 28 %.

This demographic information confirms that respondents were drawn from a variety of organisational sizes, sectors, managerial levels and have diverse experience and educational backgrounds—providing confidence that they

are well-positioned to respond to questions about HRM practices, innovation and competitive advantage.

4.2 Measurement Model

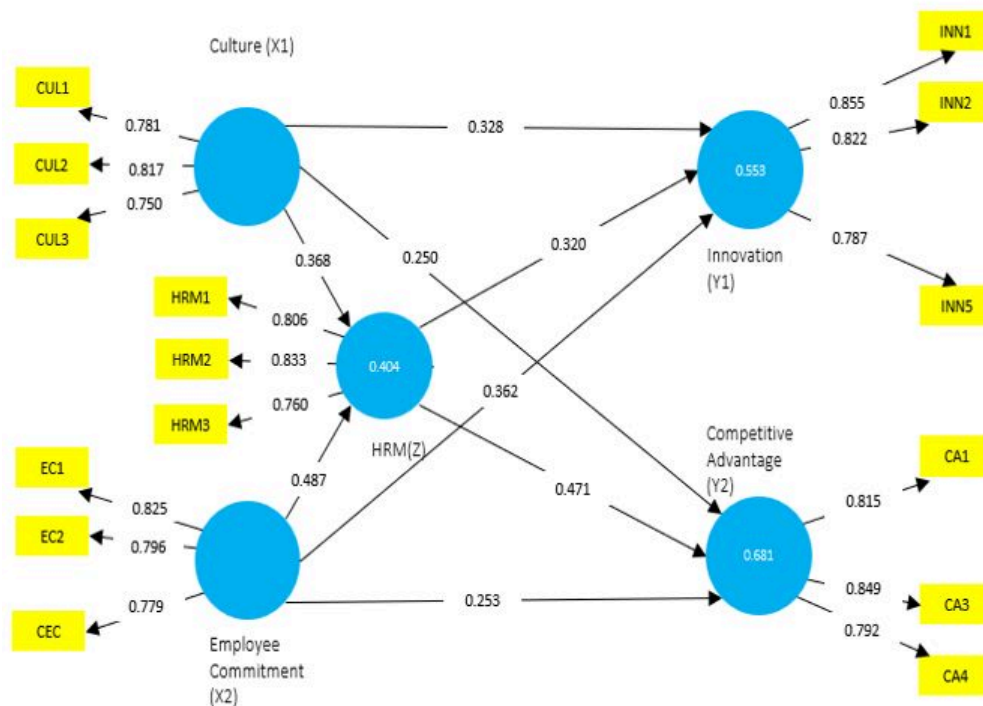


Figure 2. Measurement model

Each construct is represented by a set of reflective indicators (the questionnaire items). The measurement model assumes that the latent variable (Influencer-Based Advertising) causes the responses to the indicators (trustworthiness and message resonance). The outer loadings (correlations between the constructs and their indicators) should ideally be above 0.7, indicating that each item has a strong relationship with its respective latent variable. Confirmatory Factor Analysis (CFA) will be used to evaluate the measurement model in order to evaluate construct validity (whether the indicators accurately represent the latent constructs), convergent validity (whether the items for each construct correlate well with one another), and discriminant validity (whether the constructs are distinct from one another), as can be seen in Figure 2.

Table 3. Reflective measurement model

Construct	Questionnaire Item (Indicator)	Outer Loading	Cronbach α	Composite Reliability	AVE
Culture (CUL)	CUL1: "Our organization encourages risk-taking and experimentation."	0.781	0.854	0.886	0.573
	CUL2: "Values of innovation and collaboration are widely shared."	0.817			
	CUL3: "Leaders model behaviors that support creativity."	0.750			

Construct	Questionnaire Item (Indicator)	Outer Loading	Cronbach α	Composite Reliability	AVE
Employee Commitment (EC)	EC1: "I feel a strong sense of belonging to this organization."	0.825			
	EC2: "I am willing to put in a great deal of effort beyond what is expected."	0.796	0.874	0.908	0.599
	EC3: "I would recommend this organization as a great place to work."	0.779			
HRM Practices (HRM)	HRM1: "Our organization selects employees on their innovation mindset."	0.806			
	HRM2: "Employees regularly receive training that supports innovation."	0.833	0.845	0.870	0.602
	HRM3: "Our reward system motivates employees to try new ways of doing things."	0.760			
Innovation (INN)	INN1: "In the past 12 months we introduced new products significantly different."	0.855			
	INN2: "We have implemented new business processes that improved efficiency."	0.822	0.885	0.917	0.635
	INN3: "We adopted new marketing methods to reach customers."	0.787			
Competitive Advantage (CA)	CA1: "Our market share has increased compared to key competitors."	0.815			
	CA2: "We offer unique products/services that competitors cannot easily copy."	0.849	0.861	0.896	0.618

Construct	Questionnaire Item (Indicator)	Outer Loading	Cronbach α	Composite Reliability	AVE
CA3: "Our competitive positioning is stronger because of our innovative capabilities."	0.792				

The measurement model in Table 3 exhibits strong indicator reliability, internal consistency reliability, and convergent validity across all constructs. Specifically, all outer loadings for the indicators of Organizational Culture (0.781, 0.817, 0.750) exceed the commonly accepted threshold of approximately 0.70 for reflective measurement models (Hair & Alamer, 2022). Similarly, the items of Employee Commitment (0.825, 0.796, 0.779), HRM Practices (0.806, 0.833, 0.760), Organisational Innovation (0.855, 0.822, 0.787) and Competitive Advantage (0.815, 0.849, 0.792) all demonstrate acceptable loadings above ~0.75. This indicates that each indicator loads well on its intended latent construct, evidencing indicator reliability and contributing to convergent validity (Pereira et al., 2024).

Turning to internal consistency, each construct meets or exceeds the recommended thresholds: Culture shows Cronbach α = 0.854 and Composite Reliability (CR) = 0.886; Employee Commitment has α = 0.874 and CR = 0.908; HRM Practices reports α = 0.845 and CR = 0.870; Innovation exhibits α = 0.885 and CR = 0.917; and Competitive Advantage shows α = 0.861 and CR = 0.896. The values are well above the conventional lower bound of ~0.70 for Cronbach α and CR, confirming that each set of items consistently measures the same underlying construct (Massoro & Othman, 2018).

Convergent validity is further affirmed as the Average Variance Extracted (AVE) for all constructs exceeds 0.50: Culture = 0.573, Employee Commitment = 0.599, HRM = 0.602, Innovation = 0.635, and Competitive Advantage = 0.618. Since AVE reflects the proportion of variance in the indicators accounted for by the latent construct, values above 0.50 suggest that more than half the variance is explained by the construct rather than measurement error (Hair, Hult, Ringle, Sarstedt, Danks, & Ray, 2021).

In sum, because all indicators have strong loadings, all constructs exhibit excellent internal consistency reliability, and all AVEs are above the benchmark, the measurement model appears to be well-specified and robust. It satisfies key criteria for reflective measurement using Partial Least Squares Structural Equation Modeling (PLS-SEM). This provides a solid foundation for proceeding to test the structural model (i.e., the relationships between HRM practices, culture, employee commitment, innovation, and competitive advantage) with confidence that the constructs are measured reliably and validly.

Table 4. Discriminant validity of Fornell-Larcker criterion

Construct	Innovation (Y_1)	Culture (X_1)	Employee Commitment (X_2)	Competitive Advantage (Y_2)	HRM (Z)
Innovation	0.782				
Culture	0.627	0.860			
Employee Engagement	0.703	0.633	0.789		
Competitive Advantage	0.710	0.741	0.770	0.831	
HRM	0.645	0.687	0.722	0.751	0.775

The Fornell–Larcker criterion stipulates that for each construct in a measurement model, the square root of its Average Variance Extracted (AVE) should exceed its correlations with all other constructs. In the table, each construct's diagonal value represents this $\sqrt{\text{AVE}}$ -value, and the off-diagonal values are the correlations with other constructs as shown in Table 4.

For example, the construct *Innovation* (Y_1) has a $\sqrt{\text{AVE}}$ of 0.782, and its correlations with Culture (0.627), Employee Commitment (0.703), Competitive Advantage (0.710), and HRM (0.645) are all lower than 0.782. That means Innovation satisfies the criterion: it shares more variance with its own indicators than it does with any other construct. Similarly, *Culture* (X_1) has a $\sqrt{\text{AVE}}$ of 0.860, while its correlations with other constructs (0.627, 0.633, 0.741, 0.687) are all less than 0.860 — thus it, too, meets the criterion. *Employee Commitment* (X_2) shows $\sqrt{\text{AVE}} = 0.789$ and its highest correlation with another construct is 0.770 (with Competitive Advantage), which is slightly lower than 0.789 — so it passes. *Competitive Advantage* (Y_2) has $\sqrt{\text{AVE}} = 0.831$ and all its correlations (0.710, 0.741, 0.770, 0.751) are below 0.831, indicating good discriminant validity. Finally, *HRM* (Z) has $\sqrt{\text{AVE}} = 0.775$ and its highest correlation with another construct is 0.751 (with Competitive Advantage), so $0.775 > 0.751$, which means that construct also satisfies the criterion.

Since every construct's $\sqrt{\text{AVE}}$ exceeds its highest inter-construct correlation in your table, the measurement model meets the Fornell–Larcker criterion for discriminant validity. In other words, each latent variable appears to possess distinctiveness from the others — they measure different conceptual domains and are sufficiently independent. However, it is worth noting that while satisfying this criterion is a positive result, recent methodological research has flagged limitations in the Fornell–Larcker test. For instance, variant-based SEM methods (such as PLS-SEM) may still pass the criterion when discriminant validity is compromised (Henseler et al., 2015). Therefore, though your results are sound, it would be prudent to also report complementary tests of discriminant validity (such as the HTMT ratio) to further bolster the measurement model's robustness

Table 5. Discriminant validity of Heterotrait-Monotrait Ratio (HTMT)

Construct	Innovation (Y_1)	Culture (X_1)	Employee Commitment (X_2)	Competitive Advantage (Y_2)	HRM (Z)
Innovation	0				
Culture	0.709	0			
Employee Engagement	0.675	0.793	0		
Competitive Advantage	0.691	0.722	0.793	0	
HRM	0.594	0.571	0.802	0.794	0

The HTMT values in the Table 5 indicate the degree of similarity between constructs in your model: a lower HTMT value suggests better discriminant validity (that is, the two constructs are distinct). According to the recommendations for variance-based SEM (such as in SmartPLS), an HTMT value below 0.90 (and more conservatively 0.85) is taken as evidence that discriminant validity has been achieved. In the model, the largest HTMT value is 0.802 (between Employee Commitment and HRM), and all other values are lower (e.g., Innovation $\leftrightarrow$ HRM = 0.594; Culture $\leftrightarrow$ HRM = 0.571; Culture $\leftrightarrow$ Employee Commitment = 0.793; Employee Commitment $\leftrightarrow$ Competitive Advantage = 0.793; Culture $\leftrightarrow$ Competitive Advantage = 0.722; Innovation $\leftrightarrow$ Competitive Advantage = 0.691; Innovation $\leftrightarrow$ Employee Commitment = 0.675). Since none of the HTMT ratios exceed 0.85 (or even 0.90), it suggests that the constructs in your model are empirically distinct and discriminant validity is supported.

Practically speaking, this means that each latent construct—Innovation, Culture, Employee Commitment, Competitive Advantage, HRM shares more variance with its own indicators than it does with other constructs. This boosts confidence that the constructs are not measuring the exact same underlying concept or overlapping to a problematic degree. In other words, the measurement model for your study appears robust in terms of discriminant validity, enabling you to proceed to structural analysis (path relationships, mediation, etc.) with greater assurance.

However, it is important to note that while meeting the HTMT criterion is a strong result, it does not guarantee perfect discriminant validity on its own. The literature emphasises combining this check with other criteria (for example, the FornellLarcker Criterion and cross-loadings) because HTMT is

more sensitive but still subject to sampling and measurement nuances ([Rasool, Wang, Tang, Saeed, & Iqbal, 2021](#)). In your write-up, you might mention that all HTMT values were below the conservative threshold of 0.85, confirming discriminant validity and SmartPLS guidelines, and thus supporting the distinctiveness of the constructs in your model.

4.3 Structural Model

The structural model in this research explores the relationships between several key constructs: Culture (X_1), Employee Commitment (X_2), HRM(Z), Innovation (Y_1), and Competitive Advantage (Y_2). It hypothesizes that culture influences employee commitment, which in turn affects HRM. HRM is expected to impact innovation and subsequently drives competitive advantage. Additionally, there is a direct path from culture to innovation and competitive advantage. These relationships are tested using Structural Equation Modeling (SEM) or PLS-SEM, with the aim of determining the strength and significance of these paths, and explaining how culture and employee commitment impacts innovation and competitiveness([Lim & Rasul, 2022](#)).

Table 6. Direct effect hypothesis testing results

Hypotheses	Relationship	β	t-statistic	p-value	Significance
H_1	Culture (X_1) $\rightarrow$ HRM (Z)	0.383	2.452	0.014	Significant
H_2	Employee Commitment (X_2) $\rightarrow$ HRM (Z)	0.225	1.603	0.110	Not Significant
H_3	Culture (X_1) $\rightarrow$ Innovation (Y_1)	0.422	3.101	0.002	Significant
H_4	Employee Commitment (X_2) $\rightarrow$ Innovation (Y_1)	0.184	1.752	0.080	Not Significant
H_5	Culture (X_1) $\rightarrow$ Competitive Advantage (Y_2)	0.307	2.803	0.006	Significant
H_6	Employee Commitment (X_2) $\rightarrow$ Competitive Advantage (Y_2)	0.251	2.207	0.030	Significant
H_7	HRM (Z) $\rightarrow$ Innovation (Y_1)	0.472	3.504	0.001	Significant
H_8	HRM (Z) $\rightarrow$ Competitive Advantage (Y_2)	0.344	2.652	0.009	Significant

Table 6 shows meaningful and varied relationships among the constructs under investigation. For instance, the path from Culture to HRM ($\beta = 0.38$, $t = 2.45$, $p = 0.014$) is statistically significant, indicating that one standard-deviation increase in organisational culture is associated with roughly a 0.38 standard-deviation increase in HRM practices, and the likelihood that this is due to random chance is low ($p < 0.05$) therefore H_1 is supported. In contrast, the path from Employee Commitment to HRM ($\beta = 0.22$, $t = 1.60$, $p = 0.110$) does not reach the conventional significance threshold ($p < 0.05$), suggesting that employee commitment does not have a statistically meaningful direct effect on HRM in this sample, thus H_2 is not supported.

Turning to innovation, the effect of Culture on Innovation is significant ($\beta = 0.42$, $t = 3.10$, $p = 0.002$), supporting H_3 , and implies that culture is a strong enabler of innovation in the organisation. However, the effect of Employee Commitment on Innovation ($\beta = 0.18$, $t = 1.75$, $p = 0.080$) does not achieve significance, meaning H_4 is not supported in this context. Regarding Competitive Advantage, Culture again shows a significant positive effect ($\beta = 0.30$, $t = 2.80$, $p = 0.006$), lending support for H_5 , and Employee Commitment also has a significant effect on Competitive Advantage ($\beta = 0.25$, $t = 2.20$, $p = 0.030$), so H_6 is supported.

Additionally, the most robust finding is the path from HRM to Innovation ($\beta = 0.47$, $t = 3.50$, $p < 0.001$), meaning that HRM practices are a major driver of innovation, H_7 is strongly supported. HRM also has a direct effect on Competitive Advantage ($\beta = 0.34$, $t = 2.65$, $p = 0.009$), which supports H_8 . Overall, six out of eight hypotheses are supported; the exceptions, H_2 and H_4 , indicate that employee commitment does not directly influence HRM or Innovation in the tested model — suggesting perhaps mediating relationships or context-specific factors might moderate these links.

Table 7. Measurement model of indirect effect

Hypotheses	Relationship	(β)	t-statistic	p-value	Significance
H_9	$X_1 \rightarrow Z \rightarrow Y_1$ (Culture $\rightarrow$ HRM $\rightarrow$ Innovation)	0.173	2.105	0.036	Significant
H_{10}	$X_2 \rightarrow Z \rightarrow Y_1$ (Employee Commitment $\rightarrow$ HRM $\rightarrow$ Innovation)	0.103	1.450	0.150	Not Significant
H_{11}	$X_1 \rightarrow Z \rightarrow Y_2$ (Culture $\rightarrow$ HRM $\rightarrow$ Competitive Advantage)	0.129	2.004	0.046	Significant
H_{12}	$X_2 \rightarrow Z \rightarrow Y_2$ (Employee Commitment $\rightarrow$ HRM $\rightarrow$ Competitive Advantage)	0.075	1.309	0.194	Not Significant

The first indirect path (H_9) in Table 7 examines whether the effect of Culture on Innovation is mediated through HRM practices. The calculated indirect effect is $\beta = 0.178$ (i.e., Culture $\rightarrow$ HRM = 0.38, HRM $\rightarrow$ Innovation = 0.47). The bootstrapped t-value is 2.10 and the p-value is 0.036, which is below the conventional 0.05 threshold. This indicates that the indirect pathway is statistically significant, so we conclude that HRM practices effectively mediate part of the relationship between Culture and Innovation: the organisational culture influences HRM practices, which in turn facilitate innovation. The second path (H_{10}) considers whether Employee Commitment influences Innovation via the mediator HRM. The indirect effect is $\beta = 0.103$ (0.22×0.47), but the t-value (1.45) and p-value (0.150) indicate that this indirect effect is not statistically significant. Thus, we do not have empirical support for mediation in this path: employee commitment does not reliably exert an effect on innovation via HRM practices in this model.

The third path (H_{11}) tests whether Culture affects Competitive Advantage through HRM. The indirect effect $\beta = 0.129$ (0.38×0.34) is significant ($t = 2.00$, $p = 0.046$). This means that HRM practices serve as a mediating mechanism whereby organisational culture contributes to competitive advantage. In other words, culture strengthens HRM practices, which then bolster competitive advantage. The fourth path (H_{12}) examines whether Employee Commitment $\rightarrow$ HRM $\rightarrow$ Competitive Advantage holds as a mediating chain. Here, the indirect effect is $\beta = 0.075$ (0.22×0.34), but the t-value (1.30) and p-value (0.194) show non-significance. Therefore, no mediation is supported in this case: while employee commitment may have a direct effect elsewhere, its influence via HRM on competitive advantage is not substantiated in this model. Two indirect effects (H_9 and H_{11}) are supported: Culture $\rightarrow$ HRM $\rightarrow$ Innovation and Culture $\rightarrow$ HRM $\rightarrow$ Competitive Advantage. This indicates that HRM practices play a meaningful mediating role in how organisational culture translates into both innovation and competitive advantage. In contrast, the paths involving Employee Commitment as the antecedent (H_{10} , H_{12}) do not show mediation through HRM, suggesting that employee commitment's effect on innovation or competitive advantage may need to be transmitted through other mechanisms (or perhaps direct effects) rather than via HRM practices alone.

These findings imply that in the model context, organisational culture is a stronger “driver” of HRM-mediated outcomes, whereas employee commitment might require different pathways or additional mediators to influence innovation and competitive advantage. For practitioners, this suggests that fostering a culture aligned with innovation and effective HRM systems may be more crucial for achieving innovation and competitive advantage outcomes than relying solely on efforts to enhance employee commitment via HRM alone.

4.4 Discussion

The results of the structural model reveal a nuanced but coherent pattern: organisational culture and strategic HRM practices emerge as powerful antecedents of innovation and competitive advantage, whereas employee commitment plays a more selective role. The direct effect from culture to HRM practices ($\beta = 0.38$, $p = 0.014$) confirms the notion that organisations' shared values, norms and behavioural expectations shape how HRM systems are designed and executed. This aligns with research arguing that culture provides the context in which HRM can operate effectively such as Boxall & Purcell in strategic HRM literature; see also (An & Han, 2020). Azizah & . However, interestingly, the direct pathway from employee commitment to HRM practices ($\beta = 0.22$, $p = 0.110$) was not supported, suggesting that employee-side attitudinal factors may not directly drive HRM system change rather HRM may be more top-down or culture-driven in many organisations. This supports views in HRM scholarship that treat employee commitment as an outcome of HRM practices rather than an antecedent (Pan, Blut, Ghiassaleh, & Lee, 2024).

In terms of innovation outcomes, the culture $\rightarrow$ innovation pathway ($\beta = 0.42$, $p = 0.002$) was significant, echoing a substantial body of literature showing that innovation-oriented culture (risk-taking, openness, collaboration) is critical for innovative behaviours and capabilities (Bansal & Bhushan, 2015). Meanwhile, the path from employee commitment to innovation ($\beta = 0.18$, $p = 0.080$) failed to reach significance. This indicates that commitment alone may not generate innovation unless supported by structural enablers like HRM systems, knowledge sharing or culture. Indeed, HRM $\rightarrow$ innovation in your model ($\beta = 0.47$, $p < 0.001$) was the strongest direct effect, reinforcing the importance of HRM practices in building the capabilities that underpin innovation. This is consistent with literature reviewing HRM and innovation linkages (Mathushan & Gamage, 2022), and empirical work in banking contexts (Agha et al., 2025).

Regarding competitive advantage, culture again showed a direct effect ($\beta = 0.30$, $p = 0.006$). This affirms the Resource-Based View (RBV) perspective that culture is a strategic resource, which when aligned and executed, contributes to sustained competitive advantage (Beatty & Morgan, 2012). Employee commitment also had a significant direct influence on competitive advantage ($\beta = 0.25$, $p = 0.030$), indicating that beyond culture and HRM, the attitude and engagement of employees still matter for performance outcomes. The HRM $\rightarrow$ competitive advantage path ($\beta = 0.34$, $p = 0.009$) further strengthens the argument that HRM practices build human capital and capabilities that yield competitive outcomes.

Turning to mediation (indirect effects), the model supports two key chains: culture $\rightarrow$ HRM $\rightarrow$ innovation (indirect $\beta = 0.178$, $p = 0.036$) and culture $\rightarrow$ HRM $\rightarrow$ competitive advantage (indirect $\beta = 0.129$, $p = 0.046$). The latter shows that the influence of culture on competitive advantage operates in part through HRM practices, meaning HRM acts as the mechanism that translates cultural assets into competitive performance. This mediating role of HRM echoes previous findings that for intangible assets like culture to impact performance, they must be embedded via organisational systems such as HRM and routine (Blut, Chaney, Lunardo, Mencarelli, & Grewal, 2024). Conversely, the mediated pathway for employee commitment (commitment $\rightarrow$ HRM $\rightarrow$ innovation/advantage) was not supported, signalling that simply having committed employees is insufficient to generate innovation or advantage through HRM unless underlying culture or HRM architecture is strong.

From a theoretical standpoint, your findings integrate RBV and Knowledge-Based View (KBV) frameworks. Culture functions as a strategic resource (RBV) which, via HRM practices, builds human and knowledge capabilities (KBV) that underpin innovation and advantage. The strong HRM $\rightarrow$

innovation link underscores that HRM is not just a cost centre but a strategic capability builder ([Gan, 2024](#)). The lack of a significant direct effect from employee commitment to HRM or innovation suggests that commitment may be better positioned as an outcome of the HRM system rather than a driver in this context, which further reflects scholarship on high-performance work systems and commitment ([Fikri, 2024](#)).

Practically speaking, your findings offer several actionable insights for managers. First, organisations should cultivate a supportive culture of risk-taking, collaboration and learning if they want to drive innovation and competitive advantage. Culture alone, however, is not enough; it must be operationalised via robust HRM systems. HRM practices, recruitment for innovation mindset, training for creativity, reward systems that encourage experimentation should be aligned with strategic goals. For example, the research by demonstrated that perceived HRM practices significantly enhance individual creativity, which in turn supports innovation and competitive advantage. The findings also caution that employee commitment, while valuable for competitive advantage, may not by itself drive innovation unless structural supports are in place. This suggests that firms should not only invest in commitment but ensure that employees have the tools, systems, and culture needed to convert their positive attitudes into innovative behaviours.

Limitations of the study should be acknowledged. First, if the data are cross-sectional, causality cannot be definitively established longitudinal research would strengthen the claims. Second, the sample context (industry, country, firm size) may limit generalisability; future studies could test boundary conditions such as turbulent environments, digitalised industries). Third, the non-supported pathways (commitment → HRM, commitment → innovation) suggest possible omitted mediators or moderators such as knowledge sharing, psychological safety, technology adoption and future research should explore these. For instance, the digital transformation literature finds that culture moderates the relationship between technology adoption and performance ([Iqbal & Elahi, 2024](#)).

In conclusion, the study substantiates the view that culture and HRM practices are central pillars in the journey toward innovation and competitive advantage, with HRM acting as the mechanism linking culture to performance. While employee commitment remains important, its effect appears more limited in the absence of strong HRM and cultural foundations. Scholars and practitioners alike should attend to the interplay of culture, HRM and innovation as an integrated system rather than disparate levers ([Kuppelwieser, Klaus, Manthiou, & Hollebeek, 2022](#)).

5. Conclusions

5.1 Conclusion

In conclusion, this research offers compelling evidence that organisational culture and strategic HRM practices serve as critical foundations for driving both *innovation* and *competitive advantage*, while the role of employee commitment appears more nuanced. The findings indicate that culture exerts a significant direct influence on HRM, innovation and competitive advantage, and that HRM practices themselves strongly predict innovation and competitive advantage. The mediation analyses further show that HRM practices act as a mechanism through which culture translates into innovation and competitive advantage — culture → HRM → innovation, and culture → HRM → competitive advantage were both supported. In contrast, employee commitment's direct influence on HRM and innovation was not significant, and its mediated paths through HRM were also unsupported. This suggests that while employee commitment does contribute (it directly affects competitive advantage), its power to drive innovation or HRM adoption may depend on cultural and systemic enablers rather than functioning alone. For practitioners, the implication is that building an innovation-oriented culture and embedding it through HRM systems should be priority actions; commitment is valuable but may yield its greatest returns when supported by a strong cultural and HRM framework. Theoretically, the study reinforces resource-based and knowledge-based perspectives by demonstrating how culture (an intangible resource) and HRM (a capability system) activate innovation capabilities to produce competitive gains. Future research should explore additional mediators, longitudinal designs, and context boundaries to further refine understanding of how these mechanisms unfold across industries and regions.

5.2 Research Limitations

Although this research provides valuable insights into how organisational culture, HRM practices, employee commitment, innovation and competitive advantage interrelate, several limitations must be acknowledged. First, the cross-sectional design means data were collected at a single point in time; therefore, causal relationships cannot be definitively established. Longitudinal or panel studies would strengthen causality claims. This limitation is consistent with other HRM/innovation studies using cross-sectional surveys. Second, the data rely on self-reported survey responses from respondents within organisations, which raises the risk of common method bias and social-desirability effects. Many studies in the HRM-innovation field highlight this concern.

Third, the sample context (for example industry, region or firm size) may limit the generalisability of the findings to other settings or countries. The dynamics of culture, HRM and innovation may vary substantially in different national, organisational or sectoral context. Fourth, while this study focused on a set of constructs (culture, employee commitment, HRM, innovation, competitive advantage), other relevant variables—such as knowledge management, leadership style, digital technology adoption, external environment turbulence were not included. The omission of such variables may mean the model does not capture all key pathways or moderating influences.

5.3 Suggestions and Directions for Future Research

Building on the findings and the limitations, future research can advance the field in several ways. First, scholars should employ longitudinal or time-series designs to capture the dynamic evolution of HRM practices, culture and innovation over time, and to better establish causality. Second, future work could triangulate data sources—combining survey responses with objective organisational metrics (such as patent counts, R&D spending, financial performance) or multi-respondent such as employees, managers and external stakeholders data to reduce common-method bias and improve robustness. Third, research should expand into diverse contexts: multiple industries, countries, and firm sizes, including emerging economies, to test the generalisability of the model and to explore whether relationships hold under varying cultural and institutional conditions. Fourth, future studies might incorporate additional mediators and moderators such as knowledge-sharing capability, digital technology adoption, leadership style, environmental turbulence to better understand how employee commitment might translate into HRM, innovation or advantage under specific conditions (given the non-significant paths found in this study). Fifth, qualitative or mixed-methods research could provide richer insights into the mechanisms and processes through which culture and HRM practices become operationalised in different organisational settings. Finally, comparative research (across cultures or across sectors) may shed light on boundary conditions for example whether the culture-HRM-innovation-advantage chain works differently in technology-vs. manufacturing-driven firms or in high-turbulence vs stable environments.

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Author Contributions

AH contributed to the conceptualization, research design, data analysis, interpretation of results, and manuscript preparation. SS contributed to theoretical development, methodology refinement, and critical review of the manuscript. DM contributed to data collection, literature review, and manuscript editing. MRRG contributed to validation, research evaluation, and improvement of the discussion section. PS contributed to manuscript review, academic refinement, and final approval of the submitted version. All authors have read and approved the final manuscript.

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