

Agile human resource strategy and leadership for innovation performance in the digital era

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Orientation: Indonesia's automotive industry faces technological disruption and global competition, pushing organisations to adopt agile human resource management (HRM) and leadership practices to sustain innovation performance (IP).

Research purpose: This study tests the effects of agile HR strategy (AHRS) and agile leadership (AL) on IP, with digital readiness (DR) as a mediator and agile culture as a moderator.

Motivation for the study: Evidence on how agile and digital transformation jointly shape IP in emerging markets is still limited. This study responds by examining Indonesia's automotive sector.

Research approach/design and method: A quantitative cross-sectional survey of 230 professionals in major automotive firms in West Java was analysed using partial least squares structural equation modelling (PLS-SEM) to estimate direct, indirect and moderating effects.

Main findings: Agile HR strategy and AL significantly improved IP, both directly and via DR. Digital readiness was the strongest predictor. Agile culture did not significantly moderate the relationships, suggesting a foundational rather than contingent role.

Practical/managerial implications: Firms should strengthen adaptive HR practices and leadership development that support empowerment, collaboration and digital vision, alongside investments in infrastructure, employee competence and process integration to convert agility into sustained IP.

Contribution/value-add: The study extends dynamic capabilities and the resource-based view by integrating agile HR, leadership and DR in an emerging-market context, offering actionable insights for managers and policymakers aiming to enhance competitiveness and digital transformation.

Keywords: agile HR strategy; agile leadership; digital readiness; innovation performance; automotive industry.

Introduction

The contemporary business landscape, marked by unprecedented volatility, uncertainty, complexity and ambiguity (VUCA), has redefined organisational imperatives, particularly within capital-intensive industries such as automotive manufacturing. This transformation necessitates a fundamental rethinking of human resource management (HRM) paradigms, moving from traditional approaches towards more agile and adaptive practices. Within this context, Indonesia's automotive industry, concentrated in West Java, offers a critical setting to explore how agile human resource strategies and leadership can foster innovation performance (IP) amid systemic disruption. Such a context underscores the urgency of integrating agility into HR practices as a strategic response to environmental turbulence.

The global automotive sector is undergoing a profound transformation driven by technological disruption, electrification, autonomous systems and evolving consumer demands. In Indonesia, the industry contributes 10.16% of gross domestic product (GDP), with West Java alone accounting for 19.6% of national car sales (Negara & Hidayat, 2021). This strategic significance underlines the urgency of optimising human resource (HR) practices to enhance innovation capacity. Prior research has emphasised the role of agile HR as a determinant of organisational adaptability. McMackin and Heffernan (2021) define agile HR as the application of agile principles to HR operations, emphasising responsiveness and customer value. Similarly, Moh'd et al. (2024) demonstrate that agile HR not only improves efficiency and employee satisfaction but also nurtures innovative and adaptable organisational cultures. The automotive sector's reliance on complex

supply chains and safety-critical systems underscores the need for agility. Industry evidence shows that product-focused agile teams can accelerate development cycles by 40% and increase engineering efficiency by 25% (Askarpour & Kokaly, 2024). This evidence positions agile HR as both a structural and cultural enabler of IP in fast-changing environments.

Parallel to HR practices, leadership within agile frameworks has emerged as a pivotal driver of innovation. Meta-analytical evidence confirms strong effects of agile leadership (AL) on performance, effectiveness and innovation (Porkodi, 2024). Agile leaders enable transformation through rapid decision loops, participatory engagement and adaptive practices that sustain efficiency (Rialti & Filieri, 2024). In the automotive context, such leadership is especially relevant as firms confront challenges of electrification and autonomous driving, with mature agile teams playing a decisive role in fostering innovation (Gren & Pettersson, 2024). Agile leadership thus complements agile HR by aligning vision, empowering teams and embedding adaptability within decision-making structures.

Another critical determinant is digital readiness (DR), which represents an organisation's ability to integrate digital capabilities into its operations. Lokuge et al. (2019) identify dimensions such as information technology (IT), cognitive, cultural and strategic readiness as prerequisites for innovation. Building on this, Xu et al. (2024) show that digital transformation enhances IP through mediating mechanisms such as big data capability and organisational agility. Complementary findings from Banholzer et al. (2023) reveal that firms combining innovation culture with DR outperform their competitors in leveraging technological change. In contrast, AlNuaimi et al. (2022) demonstrate that the interplay of leadership, agility and digital strategy yields synergistic outcomes in digital transformation. This highlights DR not merely as an infrastructure capability, but as a strategic lever that connects human, cultural and technological assets to IP.

Organisational culture is widely recognised as a contextual factor that shapes the success of agile transformations. Prior research demonstrates that cultural attributes can either amplify or diminish the impact of strategic initiatives on IP. For instance, Ghasemzadeh et al. (2019) highlight the moderating role of innovation culture in strengthening the link between organisational learning and IP. Similarly, Gren and Pettersson (2024) observe that cultural values such as cooperation over competition, collective value creation over departmental ownership and collaboration over control are fundamental to sustaining agile practices. Complementing these insights, Goncalves et al. (2020) reveal that agile culture fosters innovation both within organisations and through external collaborations, while Jiménez-Jiménez and Sanz-Valle (2011) emphasise that innovation culture plays a pivotal role in translating organisational learning into tangible performance outcomes. Accordingly, culture functions as the underlying

fabric that determines whether agile HR and leadership efforts can be effectively institutionalised.

Despite this growing body of literature, significant gaps remain in understanding the integrated effects of agile HR strategy (AHRS), AL and agile culture on IP, especially in complex industrial contexts. Heilmann et al. (2020) note that research rarely addresses how agile HR practices interact with cultural and leadership dynamics in shaping long-term IP. This gap is particularly notable in emerging markets such as Indonesia, where the automotive industry must build agile teams, empower employees and foster proactive cultures to remain competitive (Niyaz et al., 2025). Empirical evidence suggests that Indonesian automotive firms continue to face challenges in translating strategic agility into sustainable innovation and competitive advantage (Abdullah, 2023). Therefore, a more holistic approach that integrates HR, leadership, culture and DR is needed to fully capture the determinants of IP in this sector.

Indonesia's automotive industry, characterised by its evolving participation in global production networks and dominated by foreign manufacturers, provides a distinctive empirical context for examining these dynamics (Soejachmoen, 2016). This industrial corridor not only contributes significantly to Indonesia's economic growth but also reflects the pressures of global technological disruption, such as electrification, digital connectivity and autonomous driving. Within this setting, examining how agile HR strategies and leadership approaches interact with DR and agile culture offers valuable insights into building IP. Such an approach enables contextually grounded theoretical advancements while simultaneously providing actionable strategies for practitioners navigating systemic disruptions.

To address these issues, this study adopts an integrated theoretical framework that draws from the dynamic capabilities perspective, the resource-based view and organisational agility literature. Agile HR strategies and AL are conceptualised as dynamic capabilities that enable organisations to sense and seize opportunities, while DR represents a bridging mechanism that translates these practices into IP. Agile culture, in turn, provides the contextual foundation shaping the effectiveness of these relationships. By applying this framework to the Indonesian automotive sector, the study not only contributes to advancing theory but also generates practical implications for organisations seeking to strengthen their human resource strategies in the digital age. Ultimately, the integration of these constructs advances understanding of how human resource practices, leadership and culture jointly drive innovation, thereby offering both theoretical enrichment and practical guidance for organisations in emerging economies.

To address these challenges and fill the identified research gap, this study aims to examine the direct effects of AHRS

and AL on IP and investigate the mediating role of DR as well as the moderating role of agile culture within the Indonesian automotive sector. Specifically, the research objective is to develop an integrated understanding of how organisational agility in human resource systems and leadership capabilities shapes IP in a digitally disruptive environment. By explicitly articulating these objectives, the study intends to provide both theoretical advancement and practical insights for strengthening competitiveness in emerging market industrial contexts.

Literature review

This study is grounded in the dynamic capabilities perspective (Teece et al., 1997), complemented by the resource-based view (Barney, 1991) and organisational agility theory (Sambamurthy et al., 2003). These theoretical foundations explain how organisations integrate, reconfigure and renew resources to sustain competitiveness in volatile and digitally disruptive environments. Within this framework, AHRS, AL and DR are positioned as dynamic capabilities that enable firms to sense opportunities, seize resources and transform operations for enhanced IP. The integration of these perspectives allows for a comprehensive understanding of how firms can achieve resilience and sustainable advantage in the digital era.

While extensive research has demonstrated the positive role of agile HR and AL in driving innovation, empirical findings remain mixed and context-dependent. For instance, Porkodi (2024) provides strong evidence that AL enhances innovation capability through a comprehensive meta-analysis demonstrating significant relationships with innovation management and organisational effectiveness. However, Gren and Pettersson (2024) suggest that leadership agility alone is insufficient without a supportive organisational culture and structural readiness, as evidenced by their investigation of team maturity in agile automotive reorganisation. Similarly, although Moh'd et al. (2024) report that agile HR practices can accelerate innovation through flexibility and empowerment, with incremental changes improving job satisfaction and organisational adaptability, Heilmann et al. (2020) highlight implementation challenges in small and medium-sized enterprises (SMEs), noting that agile HR may not effectively translate into performance outcomes when organisational readiness and digital capability are limited. This inconsistency suggests that organisational context and digital maturity may significantly influence IP. Furthermore, while several scholars emphasise culture as a critical success factor in agile transformations (Goncalves et al., 2020), recent empirical evidence reveals that culture's moderating effect on innovation may be more complex than previously understood (Duarte & Carvalho, 2024), suggesting that cultural configurations rather than individual cultural dimensions serve as boundary conditions for innovation success. These contradictions indicate a need to re-evaluate how agile HR, AL, DR and culture interact to shape IP, especially in emerging market industries where empirical insights remain limited. This study

addresses these gaps by examining an integrated model within Indonesia's automotive sector.

Recent empirical studies also reinforce the strategic relevance of agile capabilities in enabling digital transformation and organisational adaptability (Cappelli & Tavis, 2018; Hess et al., 2016; Sarstedt et al., 2021). However, several scholars highlight that the effectiveness of agile practices remains contingent upon technological maturity and contextual readiness, suggesting variability in empirical outcomes (Jie et al., 2025; Wagner & Neshat, 2012). These contrasting findings emphasise the need to further investigate the integrated roles of agile HR, AL, DR and agile culture in shaping IP, particularly within emerging market industrial environments.

Agile HR strategy represents a departure from traditional HR models by emphasising adaptability, cross-functional collaboration and employee-centred practices (McMackin & Heffernan, 2021; Moh'd et al., 2024). Prior studies indicate that agile HR fosters employee engagement, reduces bureaucratic rigidities and enhances creativity, which together accelerate innovation processes (D'Souza, 2024; Heilmann et al., 2020). In practice, agile HR functions as both a structural enabler and a cultural catalyst for innovation:

H1: Agile HR strategy has a positive effect on IP.

Agile leadership plays a pivotal role in strengthening organisational adaptability. Leaders who empower teams, facilitate rapid decision-making and create psychologically safe environments enhance both transformation and IP (Porkodi, 2024; Silva-Martinez, 2024). Evidence further suggests that agile leaders contribute to value creation through sensing and seizing capabilities, while fostering efficiency through collaborative and evolutionary practices (Kaya, 2023; Rialti & Filieri, 2024). This highlights the dual role of AL in facilitating strategic alignment while fostering a culture of innovation:

H2: Agile leadership has a positive effect on innovation performance.

Agile practices are strongly associated with DR, defined as the organisational capability to align digital infrastructure, employee skills and processes with strategic goals. Agile HR promotes readiness through continuous learning and adaptive systems (D'Souza, 2024), while AL supports readiness by articulating a digital vision and leading transformation efforts (AlNuaimi et al., 2022). Accordingly, both HR and leadership practices are foundational in shaping digital transformation pathways:

H3: Agile HR strategy positively influences digital readiness.

H4: Agile leadership positively influences digital readiness.

Digital readiness provides firms with the technological capabilities and cultural orientation required to leverage digital tools for performance improvement (Lokuge et al., 2019). Empirical evidence shows that organisations with higher DR achieve stronger outcomes in speed, adaptability

and collaborative innovation (Jun et al., 2022; Pingali et al., 2023). This highlights DR as a critical mechanism that bridges strategic intent with tangible IP:

- H5:** Digital readiness positively influences innovation performance.
- H6:** Digital readiness mediates the relationship between agile HR strategy and innovation performance.
- H7:** Digital readiness mediates the relationship between agile leadership and innovation performance.

Cultural context further shapes the effectiveness of agile practices. Agile culture, characterised by adaptability, collaboration and innovation orientation, has been shown to strengthen the impact of organisational initiatives on IP (Ghasemzadeh et al., 2019; Goncalves et al., 2020). Research in the automotive sector emphasises that values such as cooperation, shared ownership and collective problem-solving are essential for sustaining agile transformation (Gren & Pettersson, 2024). Thus, agile culture acts as a moderator that determines whether strategic initiatives can be translated into consistent innovation gains:

- H8:** Agile culture moderates the relationship between agile HR strategy and innovation performance.
- H9:** Agile culture moderates the relationship between agile leadership and innovation performance.

Despite the growing body of literature, several gaps remain. Limited research has examined the combined effects of AHRS and AL on IP through the mediating role of DR. The moderating role of agile culture in these relationships also remains underexplored, particularly in industry-specific settings. Moreover, much of the literature originates from developed economies, resulting in the under-representation of emerging market contexts. Given the strategic importance of Indonesia's automotive industry, particularly its concentration in West Java and its transformation towards electrification, digital connectivity and autonomous capabilities, this study addresses these gaps by empirically testing an integrated model linking agile HR, AL, DR, agile culture and IP in the Indonesian automotive sector. By doing so, the study not only contributes to theoretical enrichment but also provides actionable insights for firms navigating digital disruption in emerging markets.

Research design

Research approach

This study adopts a quantitative explanatory design to investigate the causal relationships among AHRS, AL, DR, agile culture and IP. A cross-sectional survey method was employed, enabling efficient data collection and statistical testing using Partial Least Squares Structural Equation Modelling (PLS-SEM). This design is particularly suitable for assessing complex relationships involving mediation and moderation effects, while also allowing for comprehensive insights into how adaptive organisational capabilities enhance IP in digitally disruptive contexts (Creswell & Creswell, 2017). The explanatory design further ensures that

the study not only identifies associations but also examines directional effects across constructs, making it highly relevant for theory testing in strategic HRM research.

Research setting and context

The research was conducted within the automotive industry in West Java, Indonesia, a region that represents the hub of national automotive manufacturing. Five industrial zones were selected to capture the sector's characteristics: Karawang International Industrial City (KIIC), East Jakarta Industrial Park (EJIP), Greenland International Industrial Center (GIIC), Jababeka Industrial Estate-Cikarang (JIEC) and Bekasi International Industrial Estate (BIIE). These zones host both multinational corporations and local suppliers, providing diversity in organisational profiles while maintaining contextual homogeneity in terms of industrial dynamics and regulatory environments. This context is particularly strategic given Indonesia's transition toward electrification, digital integration and global supply chain participation, thereby offering a fertile setting to examine agile HRM practices.

Sampling design and data collection

To ensure methodological rigour, the sample size determination followed the recommendation of Hair et al. (2019), which states that PLS-SEM requires a minimum sample size ranging from five to ten times the number of indicators in the model. As this study employed 23 indicators, the upper threshold of 10 times was adopted to reinforce statistical power and model stability, resulting in a required sample size of 230 respondents. A stratified random sampling approach was subsequently implemented across organisational size, functional areas (HR, operations, R&D and production) and hierarchical levels (staff, supervisors and managers). Data were collected through structured questionnaires administered both online and offline, with support from trained research assistants to ensure consistency and respondent engagement. A pilot test was conducted to refine instrument clarity prior to full deployment, enhancing representativeness and mitigating potential sampling bias.

To ensure ethical compliance, confidentiality and anonymity were strictly maintained throughout the research process. Participation was voluntary, and informed consent was obtained prior to data collection. No personally identifiable information (such as employee name, identification number or organisational reference) was requested or recorded. All responses were processed in aggregate form and securely stored using password-protected digital files accessible only to the research team. The study adhered to the ethical review procedures of the affiliated institution.

Instrumentation and measurement

All constructs were adapted from established and validated scales, with adjustments to suit the Indonesian automotive industry context. The measurement framework is summarised as follows:

- Agile HR Strategy: based on Muduli and Pandya (2018) and Stankevičiūtė and Savanevičienė (2018), emphasising employee empowerment, sustainable HR practices and adaptive HR processes.
- Agile Leadership: adapted from Joiner (2019) and Parker et al. (2015), focusing on contextual adaptability, team empowerment, innovation orientation and cross-functional collaboration.
- Innovation Performance: drawn from Rajapathirana and Hui (2018) and Saunila (2016), assessed through speed of innovation, adaptability, implementation success, technological advancement and collaborative engagement.
- Digital Readiness: following Lokuge et al. (2019) and Quinton et al. (2018), covering digital infrastructure, employee competence, process integration, organisational adaptability and digital strategic orientation.
- Agile Culture: adapted from Cameron (2011) and Goncalves et al. (2020), focusing on adaptability, collaboration, experimentation, empowerment and value orientation.

To strengthen construct validity, translation and back-translation procedures were conducted for the Indonesian version of the instrument and expert judgement was solicited from academics and industry practitioners to ensure contextual relevance.

Data analysis strategy

Data were analysed using PLS-SEM with SmartPLS software, which is particularly appropriate for models involving mediation and moderation. The analysis proceeded in two stages. Firstly, the measurement model was assessed for reliability, convergent validity and discriminant validity. Secondly, the structural model was evaluated through path coefficients, effect sizes, mediation and moderation tests and predictive relevance. Bootstrapping procedures were applied to assess the significance of indirect effects and strengthen the robustness of the findings. The combination of these procedures ensures methodological rigour and enhances the credibility of statistical inferences.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Universitas Pelita Bangsa Research Ethics Committee (No. 001/EC-UPB/FEB/XII/2025). The study complied with established ethical standards for human subjects research. Informed consent was obtained from all participants, confidentiality was safeguarded, and participation remained voluntary with the option of withdrawal at any stage. Data were anonymised to protect respondent privacy and ensure the integrity of the research process.

Results

To provide a comprehensive overview of the participants, this study presents the demographic and organisational profiles of respondents involved in the survey. The information includes gender, age, educational background,

position within the company, length of service and departmental affiliation. Presenting these characteristics ensures that the data adequately capture the diversity of the workforce in Indonesia's automotive manufacturing sector, allowing for a better contextualisation of the research findings.

Respondent profile

As shown in Table 1, the demographic distribution demonstrates that the sample reflects the typical workforce composition within Indonesia's automotive manufacturing industry, which is dominated by young production employees with vocational backgrounds. This reinforces the relevance of examining agility-focused HR and leadership practices, as such a workforce context requires adaptive management approaches to strengthen innovation capability. Therefore, the characteristics of the respondents provide a meaningful foundation for interpreting the organisational dynamics explored in this study.

Structural model results

Table 2 reports the R^2 and adjusted R^2 values for the endogenous constructs in the research model, namely, DR and IP. These values indicate the proportion of variance explained by the exogenous variables, reflecting the model's explanatory power.

TABLE 1: Respondent profile.

Characteristic	<i>n</i>
Gender	
Man	65
Woman	165
Age (years)	
< 25	198
25–34	28
35–44	3
≥ 45	1
Education level	
High school or Vocational school	209
Diploma	2
Bachelor (S1)	18
Postgraduate (S2/S3)	1
Position in the company	
Operator and/or staff	219
Supervisor and/or team leader	8
Department manager	3
Duration of employment at the company (years)	
1–3	191
4–6	29
> 6	10
Department	
Engineering	3
HRD or GA	7
Logistics	7
Marketing	12
Production	159
Other	42
Total	230

HRD, Human Resource Development; GA, General Affairs.

As indicated in Table 2, the model explains 63.2% of the variance in DR and 74.5% of the variance in IP. Following the guideline of Hair et al. (2019), these values represent substantial explanatory power in PLS-SEM. These results suggest that the combined influence of AHRS, AL and DR forms a robust framework capable of predicting IP, thereby supporting the theoretical relevance of the research model.

Table 3 presents the results of the path coefficient analysis, which examines the relationships among the key constructs in the proposed research model. The analysis includes direct effects of AHRS and AL on DR and IP, as well as the mediating role of DR and the moderating influence of agile culture. The path coefficients, together with their respective *t*-statistics and *p*-values, indicate the significance and strength of the hypothesised relationships.

Table 3 presents the path coefficient analysis, showing that both AHRS and AL exert significant positive effects on DR and IP. Digital readiness demonstrates the strongest direct effect on IP, underscoring its central mediating function within the model. Meanwhile, the moderating effect of agile culture is statistically insignificant, indicating that cultural agility may act more as a foundational organisational condition rather than a contingency that alters causal strength. These findings partially support the proposed hypotheses and highlight the varying influence of each construct.

Based on the statistical results presented in Table 3, five hypotheses were supported, while the two moderating hypotheses were not supported. Specifically, H1 and H2 were accepted, indicating that both AHRS and AL significantly influence IP. H3 and H4 were also accepted, confirming that AHRS and AL have a significant effect on DR. H5 was supported, demonstrating that DR significantly enhances IP. In contrast, H8 and H9 were rejected, as the moderating effects of agile culture on the relationships between AHRS, AL and IP were not statistically significant. These findings collectively highlight the strength of direct and mediating relationships within the model while revealing the limited impact of culture as a moderating variable in this context.

TABLE 2. *R*-square results.

Construct	<i>R</i> -square	<i>R</i> -square adjusted
DR	0.63	0.63
IP	0.74	0.74

DR, digital readiness; IP, innovation performance.

TABLE 3: Path coefficient results.

Path	O	Sample mean	SD	<i>t</i> -statistics (O/SD)	<i>p</i> -value
AHRS → DR	0.42	0.42	0.08	5.453	0.000
AHRS → IP	0.22	0.22	0.11	2.064	0.040
AL → DR	0.41	0.42	0.08	5.043	0.000
AL → IP	0.24	0.23	0.08	3.090	0.002
DR → IP	0.39	0.39	0.10	3.947	0.000
Moderating Effect 1 → IP	0.01	0.02	0.07	0.181	0.857
Moderating Effect 2 → IP	0.05	0.04	0.06	0.759	0.448

SD, standard deviation; O, Original sample; DR, digital readiness; IP, innovation performance; AL, agile leadership.

In contrast, the moderating effects of agile culture on the relationship between agile practices and IP are not significant. This suggests that while cultural values are important for creating a supportive environment, they may not directly alter the strength of the relationships tested in this model. Taken together, the results provide empirical support for most of the hypothesised direct and mediating effects, while indicating that agile culture may function more as a foundational condition rather than a moderating factor.

Table 4 presents the results of the specific indirect effect analysis, which evaluates the mediating role of DR in the relationship between AHRS and AL on IP. This analysis offers insights into whether the influence of agile practices on IP operates directly or indirectly through DR, serving as a mediating construct.

The results in Table 4 further confirm that DR significantly mediates the relationships between AHRS, AL and IP. This highlights the importance of digital capability development as a mechanism that translates agility-focused practices into measurable performance outcomes. Thus, organisations aiming to improve IP must prioritise investments in DR alongside strategic HR and leadership initiatives.

Discussion

Explanatory power and predictive relevance

The findings demonstrate that the proposed model offers strong explanatory power in accounting for both DR and IP. This suggests that AHRS, AL and DR are highly relevant constructs for explaining how organisations achieve innovation in the context of digital disruption. The results affirm that these elements collectively provide a robust foundation for organisational competitiveness, consistent with prior evidence that agile capabilities are crucial drivers of digital transformation outcomes (Sarstedt et al., 2021).

Direct effects of agile HR and leadership

The analysis confirms that AHRS enhances both digital preparedness and IP. This indicates that HR practices emphasising empowerment, sustainability and adaptability create an environment conducive to technological adoption and innovation. Such practices reduce bureaucratic rigidities, foster creativity and support faster decision-making, thereby strengthening an organisation's overall innovation capacity. These findings reinforce the premise of dynamic capabilities theory, which highlights the importance of reconfiguring human resources in response to uncertainty (Cappelli & Tavis, 2018; Teece, 2007).

TABLE 4: Specific indirect effect results.

Indirect effect	O	Sample mean (M)	SD	<i>t</i> -statistics (O/SD)	<i>p</i> -value
AHRS → DR → IP	0.16	0.16	0.05	3.242	0.001
AL → DR → IP	0.16	0.16	0.06	2.876	0.004

SD, standard deviation; O, Original sample; DR, digital readiness; IP, innovation performance; AL, agile leadership; AHRS, agile HR strategy.

Agile leadership also emerges as a key determinant of IP. Leaders who are adaptive, empowering and collaborative not only build organisational readiness for digital transformation but also strengthen innovation processes. This is consistent with research that positions leadership agility as a cornerstone of organisational adaptability, enabling firms to navigate technological turbulence while fostering cross-functional collaboration (Hess et al., 2016; Joiner & Josephs, 2006). Collectively, these results suggest that both HR strategy and leadership are vital levers for advancing innovation in rapidly changing industrial contexts.

Digital readiness as a central driver

Digital readiness is identified as the strongest factor influencing IP. This highlights that investments in digital infrastructure, competence development, process integration and strategic digital orientation are not optional but rather essential conditions for sustaining innovation. The results indicate that organisations with high levels of digital preparedness are better positioned to exploit technological advancements such as electrification, connectivity and autonomous systems. This aligns with the argument that DR should be viewed not merely as a technical prerequisite but as a strategic capability that transforms agility into tangible performance outcomes (Bharadwaj et al., 2013; Svahn et al., 2017).

Mediation through digital readiness

The study further reveals that DR functions as a mediating mechanism through which agile HR and AL enhance IP. This finding underscores that the value of agility is most effectively realised when accompanied by strong digital capabilities. It reflects the logic of the technology organisation environment framework, which emphasises readiness as a key enabler of organisational success (Eveland & Tornatzky, 1990). From a theoretical perspective, this extends dynamic capabilities theory by illustrating how DR converts agile practices into measurable IP (Ellström et al., 2022).

Moreover, the results suggest that HR and leadership practices do not act in isolation but work synergistically through DR. When organisations simultaneously strengthen adaptive HR systems and leadership agility, they create complementary effects that amplify both workforce flexibility and digital maturity. This synergy aligns with recent studies emphasising the interdependence of human and technological capabilities in sustaining IP (Jie et al., 2025).

Non-significant moderation of agile culture

Interestingly, the study finds that agile culture does not moderate the relationships as initially hypothesised. This suggests that culture may play a more fundamental role as an antecedent or contextual condition rather than as a moderating factor. In contexts where an agile culture is already embedded, the effects of HR and leadership practices

on innovation appear to be consistently strong, regardless of cultural variation. This interpretation is consistent with prior work arguing that culture acts as a foundational enabler rather than a conditional factor (Vial, 2021).

The absence of moderation may also reflect the specific characteristics of the automotive industry, where standardisation, quality control and regulatory requirements constrain cultural variability as a determinant of performance (Wagner & Neshat, 2012). While this does not diminish the importance of culture, it suggests that its role in digital transformation may be more structural, shaping the overall organisational environment rather than altering specific causal relationships. Future studies could adopt configurational approaches to capture more nuanced cultural effects (Duarte & Carvalho, 2024).

Practical implications

The findings provide several insights for HRM. Agile HR practices should prioritise empowerment, sustainability and adaptive systems, as these enhance both DR and IP. Leadership development programmes should focus on strengthening adaptability, digital vision and collaborative problem-solving, equipping leaders to drive transformation and foster innovation.

The mediating role of DR underscores the importance of aligning agile practices with investments in digital infrastructure and employee capabilities. HR professionals should collaborate closely with IT and operational units to ensure that human and technological systems reinforce one another, thereby maximising IP (Van de Wetering, 2021).

Implications for emerging market contexts

By focusing on West Java's automotive industry, this study contributes to the understanding of agile transformation in emerging markets. These contexts often face challenges such as infrastructure constraints, skills shortages and institutional gaps (Vakola, 2013). Nevertheless, the findings suggest that agile HR and leadership can mitigate these limitations by strengthening organisational capacity for digital innovation. This insight resonates with Indonesia's *Making Indonesia 4.0* strategy, which emphasises the role of digital adoption in maintaining competitiveness, including among SMEs (Anatan & Nur, 2023).

The evidence also demonstrates that agile practices are applicable not only to large multinational corporations but also to local suppliers and medium-sized firms. By embedding agility in HR and leadership while advancing DR, organisations in emerging markets can strengthen their position in global value chains and sustain IP.

Limitations and future research

Despite offering valuable insights, this study has limitations. The cross-sectional design restricts causal interpretation,

highlighting the need for longitudinal research to capture the evolving nature of digital transformation (Bryman & Bell, 2011). The focus on West Java's automotive sector enhances contextual richness but may limit generalisability to other industries or regions undergoing different forms of disruption (Nambisan et al., 2019).

Future research could re-examine the role of agile culture through refined conceptualisations and alternative methods, such as configurational approaches. Further studies should also investigate the specific mechanisms of DR – such as big data analytics, artificial intelligence adoption and digital ecosystem partnerships – that mediate the link between agile practices and innovation. Comparative work across different emerging markets would also provide deeper insights into how institutional and cultural contexts shape the effectiveness of agility in driving IP.

Conclusion

Implications

This study demonstrates that AHRS and AL significantly enhance IP within Indonesia's automotive manufacturing industry, both directly and indirectly through DR, which emerged as the strongest predictor in the model. These results confirm the relevance of dynamic capabilities theory in explaining how agility-oriented practices drive IP in digitally disruptive environments. Theoretically, this research advances current understanding by integrating Agile HR, AL, DR and agile culture into a single empirical framework in an emerging market context. Practically, the findings emphasise the importance of developing adaptive HR systems, strengthening leadership agility and investing in digital capability building to accelerate IP. The moderating effect of agile culture was found to be insignificant, suggesting that cultural agility may operate as a foundational rather than contingent factor – an insight that invites further investigation. The study is limited by its cross-sectional design and sector-specific scope; therefore, future research could adopt longitudinal approaches and explore multi-industry or cross-country comparisons to enrich theoretical generalisation.

Recommendations

Based on the findings, organisations are encouraged to prioritise capability development in DR as a strategic foundation for enhancing IP. Strengthening Agile HR practices and nurturing AL behaviour are essential steps in building a responsive and adaptive workforce. Employee training, cross-functional collaboration and digital upskilling initiatives should be implemented to accelerate innovation outcomes. Additionally, organisations may review cultural enablers and alignment mechanisms to support agility-focused transformation more effectively.

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In developing this manuscript, ChatGPT (OpenAI, GPT-5.1) was used in a limited capacity to refine sentence structure and enhance overall readability. All conceptual reasoning, analysis and intellectual contributions remain the original work of the authors. The final manuscript has been thoroughly reviewed and approved by the authors, who accept full responsibility for the accuracy, integrity and originality of its content.

Competing interests

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CRediT authorship contribution

Suwandi Suwandi: Conceptualisation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing, Supervision. Muhamad Ekhsan: Investigation, Methodology, Resources, Writing – review & editing. Daspar Daspar: Data curation, Formal analysis, Investigation, Writing – review & editing. Adella Devany Syahira: Data curation, Investigation, Writing – original draft. Aisaturahma Aisaturahma: Data curation, Investigation, Writing – original draft.

All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication and take responsibility for the integrity of its findings.

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Data availability

The data that support the findings of this study are available from the corresponding author, Suwandi Suwandi, upon reasonable request. Because of privacy and confidentiality agreements with participating firms, raw data cannot be shared publicly.

Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. They do not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this article's results, findings and content.

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