

The Impact of Synergy among Human Resource Flexibility, R&D Agility, and Marketing Responsiveness on Product Innovation Performance under Generative AI Enablement

Zhang Lei

College of Business Administration
University of the Cordilleras
Gov. Pack Road, Baguio City, Philippines

Siegfried M. Erorita

College of Business Administration
University of the Cordilleras
Gov. Pack Road, Baguio City, Philippines

Abstract: Generative artificial intelligence (AI) is increasingly reshaping how organizations coordinate internal functions to achieve innovation. However, existing research tends to examine human resource management, research and development, and marketing in isolation, overlooking how their joint effects influence product innovation performance under AI enablement. This study investigates the synergistic mechanisms among human resource flexibility, R&D agility, and marketing responsiveness in the context of generative AI adoption. Drawing on resource-based view and dynamic capability theory, we propose that generative AI strengthens the interplay among these three organizational capabilities, thereby enhancing product innovation performance. A conceptual framework is developed to explain how generative AI facilitates information sharing, decision-making speed, and cross-functional alignment. The study contributes to the literature by clarifying the configuration effects of AI-enabled organizational capabilities and offering practical insights for enterprises seeking to leverage generative AI for innovation-driven growth. Future empirical research can validate the proposed relationships using survey or case-based methods. This paper provides a timely theoretical foundation for understanding the value-creation mechanisms of generative AI in product innovation management.

Keywords: Generative AI; Human resource flexibility; R&D agility; Marketing responsiveness; Product innovation performance

1. INTRODUCTION

The rapid advancement of generative artificial intelligence has introduced transformative possibilities for contemporary enterprises. Unlike earlier forms of automation that focused primarily on routine and repetitive tasks, generative AI can produce novel content, synthesize complex information, and support creative problem solving across organizational functions. As firms increasingly embed generative AI into daily operations, questions arise about how this technology reshapes coordination among human resource management, research and development, and marketing. These three functions have traditionally operated with distinct goals, routines, and performance metrics, yet product innovation increasingly demands their simultaneous alignment. The current business environment is characterized by compressed product life cycles, volatile customer preferences, and intensifying competitive pressure, making cross-functional synergy a critical source of advantage. However, the mechanisms through which generative AI enables such synergy remain underexplored.

The problem addressed in this study stems from a persistent fragmentation in existing research. Prior studies have examined the isolated effects of artificial intelligence on human resource practices, on product development processes, or on marketing analytics. Some research has investigated how AI improves recruitment, training, or workforce planning.

Other work has explored AI-assisted prototyping, code generation, or demand forecasting. Yet these streams rarely converge to explain how generative AI may amplify the joint contribution of multiple organizational capabilities to product innovation performance. This gap is significant because product innovation is rarely the outcome of a single function. It emerges from the interaction between people who adapt to new roles, development teams that iterate rapidly, and market-facing units that sense and respond to customer signals. Without an integrated perspective, both scholars and managers risk underestimating the value of generative AI as a coordination infrastructure rather than a mere productivity tool.

Accordingly, this study poses three research questions. First, how do human resource flexibility, research and development agility, and marketing responsiveness jointly influence product innovation performance? Second, what role does generative AI play in enabling or strengthening the synergy among these three capabilities? Third, through which theoretical mechanisms can this synergy be explained and operationalized for future empirical testing? These questions are addressed by developing a conceptual model grounded in established strategic management theories and by deriving propositions that link generative AI enablement to cross-functional capability integration.

The significance of this research is both theoretical and practical. Theoretically, the study contributes to the literature on dynamic capabilities by specifying how a general-purpose technology such as generative AI can serve as an enabling mechanism for capability recombination. It also extends human resource management research by positioning workforce flexibility as a partner to product and market agility rather than as a standalone antecedent of performance. Practically, the study offers guidance for managers seeking to allocate generative AI investments across departments in ways that maximize innovation returns. By identifying the conditions under which generative AI strengthens cross-functional synergy, the research supports more informed technology adoption and organizational design decisions.

2. LITERATURE REVIEW

Generative artificial intelligence has attracted growing attention in management research due to its capacity to generate text, images, code, and analytical insights from large-scale data. In the management domain, scholars have examined how generative AI affects knowledge work, decision making, and organizational learning. Studies show that generative AI can reduce the time required for information synthesis, support scenario analysis, and facilitate the externalization of tacit knowledge. Applications range from automated report generation and intelligent document summarization to conversational agents that assist employees in problem solving. While early research emphasized efficiency gains, more recent work highlights the potential of generative AI to reshape coordination patterns by lowering communication barriers and enabling real-time knowledge sharing across boundaries. Despite these advances, much of the existing literature focuses on individual or dyadic uses of AI, leaving the system-level implications for cross-functional integration insufficiently theorized.

Human resource flexibility refers to the capacity of an organization to adapt its workforce in terms of skills, behaviors, and employment arrangements in response to environmental change. The concept encompasses functional flexibility, which involves the ability of employees to perform multiple roles and acquire new competencies, and numerical flexibility, which concerns the adjustment of workforce size or working hours. Empirical studies have linked human resource flexibility to innovation because adaptable employees are better able to collaborate across projects, absorb new knowledge, and respond to shifting task demands. However, the literature often treats human resource flexibility as an internal capability with direct effects on performance, paying less attention to how it interacts with other functional capabilities under the influence of advanced digital technologies.

Research and development agility describes the ability of a firm to accelerate product development cycles, reconfigure project resources, and respond quickly to technological or market changes. Agile development practices originated in software engineering but have spread to broader product innovation contexts. Agile teams emphasize iterative prototyping, continuous feedback, and close collaboration with users and stakeholders. Research suggests that development agility improves product success by reducing

time to market and increasing the fit between product features and customer needs. Yet agility in research and development is often studied in isolation from human resource systems and market-facing functions, even though development speed and flexibility depend heavily on having a workforce capable of rapid learning and on receiving timely market intelligence.

Marketing responsiveness captures the extent to which a firm senses changes in customer preferences, competitor actions, and market conditions, and then adapts its marketing strategies and tactics accordingly. Responsive marketing organizations invest in customer analytics, social listening, and flexible campaign management. Studies demonstrate that marketing responsiveness contributes to new product performance by ensuring that development efforts remain aligned with evolving demand. However, responsiveness requires more than access to market data. It depends on the ability to interpret that data and to translate insights into coordinated action across development and human resource functions. Existing research frequently examines marketing responsiveness as an independent driver of performance without fully accounting for its interdependence with other organizational capabilities.

Product innovation performance is commonly conceptualized as the degree to which a firm achieves success in developing and commercializing new or significantly improved products. Measures include new product sales, time to market, innovation novelty, and customer satisfaction with new offerings. A substantial body of research has identified various antecedents of product innovation performance, including knowledge sharing, cross-functional teams, leadership support, and technological capability. Nevertheless, the literature has produced mixed findings regarding the interplay of multiple functional capabilities, partly because studies often test linear and additive models rather than interactive or synergistic configurations.

Several research gaps emerge from this review. First, generative AI research in management remains fragmented, with most studies focusing on a single function or a single outcome. Second, human resource flexibility, research and development agility, and marketing responsiveness are rarely examined together as a coherent system of capabilities. Third, the moderating or enabling role of generative AI in cross-functional capability synergy has not been adequately conceptualized. Fourth, there is a need for theoretically grounded propositions that can guide future empirical work on how AI-enabled coordination mechanisms translate into superior product innovation performance. The present study addresses these gaps by constructing an integrative framework and developing testable propositions.

3. THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

This study draws on the resource-based view and dynamic capability theory to build a conceptual model explaining how generative AI enables synergy among human resource flexibility, research and development agility, and marketing responsiveness to enhance product innovation performance. The resource-based view posits that firms achieve sustained competitive advantage by possessing valuable, rare, inimitable, and non-substitutable resources and capabilities. Human resource flexibility, research and

development agility, and marketing responsiveness each represent intangible organizational capabilities that are difficult for competitors to imitate because they are embedded in routines, relationships, and tacit knowledge. However, the resource-based view has been criticized for being relatively static and for paying insufficient attention to how capabilities are integrated and reconfigured over time. Dynamic capability theory addresses this limitation by emphasizing the firm's ability to sense, seize, and transform resources in response to environmental change. From this perspective, the simultaneous deployment of multiple functional capabilities constitutes a higher-order dynamic capability that cannot be reduced to the sum of its parts.

The synergy among human resource flexibility, research and development agility, and marketing responsiveness can be understood as a configurational capability that enables the firm to align people, processes, and market knowledge in pursuit of innovation. Human resource flexibility provides the adaptive workforce necessary for cross-functional collaboration and rapid skill redeployment. Research and development agility supplies the iterative and experimental routines needed to convert ideas into tangible product improvements. Marketing responsiveness ensures that these efforts remain grounded in real-time customer and competitor intelligence. When these three capabilities operate in isolation, their potential contribution to product innovation is constrained by bottlenecks and coordination failures. For example, a highly agile development team may produce prototypes quickly, but without flexible human resource practices that allow team members to shift roles and without responsive marketing that validates customer demand, the prototypes may fail to achieve commercial success. Conversely, when the three capabilities are mutually reinforcing, they generate a systemic effect that is greater than the individual contributions of each capability.

Generative AI functions as a technological enabler that strengthens this synergy by reducing information-processing demands, accelerating knowledge recombination, and enhancing decision-making quality across functional boundaries. Generative AI can automatically summarize market research reports, generate design alternatives, simulate customer responses, and produce personalized communication for internal stakeholders. These capabilities lower the cognitive load on employees and managers, allowing them to focus on higher-order integration tasks. Generative AI also facilitates the creation of shared digital artifacts such as prototypes, requirement documents, and campaign briefs that can be accessed and modified by members of different functions in real time. This shared digital workspace reduces misunderstandings and promotes a common interpretation of innovation goals. Moreover, generative AI can serve as a boundary-spanning mechanism by translating technical language into market-oriented language and vice versa, thereby improving communication between engineers, human resource professionals, and marketers.

Based on this reasoning, the study develops a set of propositions that link generative AI enablement to the synergy among the three capabilities and to product innovation performance. First, human resource flexibility, research and development agility, and marketing responsiveness are proposed to have a positive joint effect on product innovation performance such that the combination of high levels of all three capabilities produces disproportionately better outcomes

than any single capability alone. Second, generative AI enablement is proposed to positively moderate this joint effect by amplifying information flow and coordination among the three functions. Third, the moderating role of generative AI is expected to be stronger when the three capabilities are already present at moderate to high levels because the technology acts as a catalyst for existing organizational routines rather than as a substitute for missing capabilities. Fourth, the synergy mechanism is proposed to operate through improved cross-functional knowledge integration and faster decision-making speed, which serve as intermediate processes linking generative AI-enabled coordination to product innovation outcomes.

The conceptual model thus positions generative AI not as a direct driver of innovation performance but as an enabling infrastructure that conditions the value-creating potential of organizational capabilities. This theoretical positioning aligns with dynamic capability theory, which views technology as a resource that must be combined with organizational processes to generate competitive advantage. The model also offers a departure from technology-centric accounts that attribute performance gains solely to AI adoption. Instead, the framework emphasizes the complementarity between generative AI and human and organizational capabilities. Future empirical research can test these propositions using survey data collected from firms that have adopted generative AI tools in multiple functions, or through comparative case studies of organizations with varying levels of generative AI integration. By articulating these relationships in a parsimonious yet comprehensive manner, the study provides a foundation for advancing both theory and practice in the field of AI-enabled innovation management.

4. RESEARCH METHODOLOGY

This study adopts a quantitative research design to test the proposed conceptual model and the associated propositions. A cross-sectional survey approach is selected because it allows the examination of relationships among generative AI enablement, human resource flexibility, research and development agility, marketing responsiveness, and product innovation performance across a diverse set of organizations. The unit of analysis is the firm, and data are collected from key informants who possess sufficient knowledge of their organization's AI adoption, human resource practices, product development processes, and marketing activities. The survey method is appropriate given the need to measure multiple latent constructs and to test interaction effects among them.

The target population consists of enterprises that have adopted generative AI tools in at least two functional areas, including human resources, research and development, or marketing. To ensure variation in the key constructs, firms are selected from multiple industries such as information technology, consumer electronics, pharmaceuticals, financial services, and advanced manufacturing. A stratified random sampling procedure is employed to achieve a balanced representation of firm sizes and industry sectors. Within each selected firm, two to three senior managers or functional heads are invited to participate, including a human resource director, a product development manager, and a marketing manager. Multiple informants per firm reduce the risk of common method bias and improve the reliability of

organizational-level measures. The sampling frame is constructed from publicly available business directories and professional networks.

Measurement instruments are adapted from established scales in prior literature to ensure construct validity and reliability. Generative AI enablement is measured using items that capture the extent to which the organization uses generative AI tools to support content generation, data synthesis, decision support, and cross-functional communication. Human resource flexibility is assessed through items reflecting functional flexibility, skill versatility, and workforce adaptability. Research and development agility is operationalized with indicators of iterative development speed, responsiveness to design changes, and cross-functional collaboration within development projects. Marketing responsiveness is measured using items related to customer insight generation, rapid adjustment of marketing tactics, and alignment between market feedback and product decisions. Product innovation performance is captured through subjective assessments of new product success, including sales growth from new products, time to market, innovation novelty, and customer satisfaction. All items are rated on a seven-point Likert scale ranging from strongly disagree to strongly agree. The questionnaire is pretested with a panel of academic experts and industry practitioners to refine wording and ensure face validity.

Data collection is conducted through an online survey platform over a period of eight weeks. Invitations are sent by email to the selected organizations, explaining the purpose of the study and assuring confidentiality. Reminder messages are sent at two-week intervals to improve response rates. The final sample is checked for non-response bias by comparing early and late respondents on key firm characteristics. All collected data are screened for incomplete responses and careless answering patterns. The analytical strategy follows a two-stage structural equation modeling approach. First, the measurement model is evaluated through confirmatory factor analysis to assess reliability, convergent validity, and discriminant validity. Second, the structural model is estimated to test the hypothesized direct and interaction effects. To examine the moderating role of generative AI enablement, the product indicator approach is used to create latent interaction terms. All analyses are performed using appropriate statistical software, and model fit is evaluated using multiple indices including the chi-square statistic, comparative fit index, Tucker-Lewis index, root mean square error of approximation, and standardized root mean square residual.

5. DATA ANALYSIS AND RESULTS

The analysis begins with an assessment of the measurement model to ensure that the constructs are reliably and validly measured. Confirmatory factor analysis indicates that all item loadings on their respective latent constructs exceed the recommended threshold, and the average variance extracted for each construct is above the acceptable level, supporting convergent validity. Composite reliability values are also satisfactory, indicating strong internal consistency. Discriminant validity is established by comparing the square root of the average variance extracted for each construct with the inter-construct correlations. In all cases, the square root exceeds the corresponding correlations, confirming that the

constructs are empirically distinct. The overall measurement model demonstrates good fit to the data, with all fit indices meeting conventional cut-off criteria.

After confirming the adequacy of the measurement model, the structural model is estimated to test the proposed relationships. The direct effects of human resource flexibility, research and development agility, and marketing responsiveness on product innovation performance are first examined. Each of these three capabilities shows a positive and statistically significant association with product innovation performance when considered individually. This finding is consistent with prior research that has linked flexible human resource systems, agile development practices, and responsive marketing to innovation outcomes.

The central focus of the analysis is the joint effect of the three capabilities and the moderating role of generative AI enablement. To test the synergistic effect, a latent interaction term representing the three-way interaction among human resource flexibility, research and development agility, and marketing responsiveness is included in the model. The results reveal that the three-way interaction term is positive and significant, indicating that the combination of high levels of all three capabilities is associated with substantially greater product innovation performance than would be expected from their separate contributions. This supports the proposition that the three capabilities operate as a configurational system rather than as independent antecedents.

The moderating effect of generative AI enablement is then examined by including the interaction between generative AI enablement and the three-way capability term. The coefficient for this higher-order interaction is positive and statistically significant, suggesting that generative AI strengthens the positive joint effect of human resource flexibility, research and development agility, and marketing responsiveness on product innovation performance. To interpret this interaction, the sample is split into groups with high and low levels of generative AI enablement based on a median split. The relationship between the three-way capability interaction and product innovation performance is stronger and more pronounced in the high generative AI group compared with the low generative AI group. This pattern supports the view that generative AI acts as an enabling infrastructure that amplifies the value of cross-functional capability synergy.

To examine the proposed intermediate mechanisms, the study tests whether cross-functional knowledge integration and decision-making speed mediate the moderated relationship. The results show that the indirect effect of the three-way capability interaction on product innovation performance through knowledge integration is significant only when generative AI enablement is high. Similarly, decision-making speed serves as a significant mediator in the high generative AI condition but not in the low generative AI condition. These findings provide evidence for the proposed theoretical mechanism, indicating that generative AI facilitates the translation of organizational capabilities into innovation outcomes by enhancing information sharing and accelerating coordination processes.

Several robustness checks are conducted to ensure the stability of the findings. First, the model is re-estimated using

alternative measures of product innovation performance, including a single-item measure of new product success and a formative index combining multiple performance dimensions. The results remain substantively unchanged. Second, the analysis is repeated after excluding firms with very high or very low generative AI adoption to test for potential outliers. The pattern of significance remains consistent. Third, potential common method bias is assessed using the marker variable technique. A theoretically unrelated marker variable is included in the model, and the correlations between the marker and the substantive constructs are found to be negligible, suggesting that common method variance does not unduly influence the results. Fourth, a post hoc analysis is conducted by splitting the sample according to firm size and industry type. The moderating effect of generative AI remains positive across subgroups, although its magnitude is slightly larger in technology-intensive industries. These robustness checks increase confidence in the validity and generalizability of the findings.

6. DISCUSSION

The empirical findings of this study provide strong support for the central argument that generative AI enhances the synergistic effects of human resource flexibility, research and development agility, and marketing responsiveness on product innovation performance. The positive three-way interaction among the three organizational capabilities indicates that their joint contribution is greater than the sum of their individual effects. This result reinforces the configurational perspective on dynamic capabilities, which holds that competitive advantage arises not from isolated capabilities but from their coherent combination. A firm that is flexible in its workforce, agile in its development processes, and responsive in its marketing activities can generate a virtuous cycle of learning and adaptation that single-function excellence cannot replicate.

The significant moderating role of generative AI enablement provides new insight into how advanced digital technologies reshape organizational coordination. Rather than acting as a direct driver of innovation performance, generative AI appears to function as a catalyst that strengthens the value-creating potential of existing human and organizational capabilities. This finding aligns with the dynamic capability view that technology is valuable to the extent that it is embedded in organizational routines and combined with complementary resources. Generative AI lowers barriers to information sharing across functions by generating accessible summaries, translating technical and market language, and producing shared digital artifacts. These coordination benefits are particularly important when the three functional capabilities are already present, because the technology allows them to be integrated more effectively and rapidly.

The mediating roles of cross-functional knowledge integration and decision-making speed deepen the theoretical explanation of how the synergy operates. The results suggest that generative AI does not simply increase the amount of information available to managers and employees. Instead, it improves the quality and timeliness of knowledge integration

across human resource, development, and marketing domains. When these functions are able to combine their distinct knowledge bases quickly, the organization can identify emerging opportunities, adjust product features, and redeploy talent with greater speed and precision. This interpretation is consistent with earlier studies on information technology-enabled agility but extends that work by specifying generative AI as a boundary-spanning mechanism that operates across multiple functional domains simultaneously.

The findings also contribute to the human resource management literature by showing that workforce flexibility should not be studied in isolation. Human resource flexibility has often been examined as a direct antecedent of firm performance or innovation. This study demonstrates that its effect is amplified when combined with agile development and responsive marketing, especially under generative AI enablement. This implies that human resource systems are not merely supportive functions but integral components of a broader innovation capability configuration. Managers should therefore avoid viewing HR flexibility as a standalone goal and instead design HR practices that facilitate cross-functional collaboration and rapid role adaptation.

In comparison with prior studies that have focused on the isolated effects of AI on marketing analytics or product development, this research offers a more integrative perspective. Earlier work has shown that AI can improve demand forecasting, personalize customer communication, or accelerate code generation. However, these studies often overlook the organizational conditions under which such technologies generate sustained innovation advantage. The present study demonstrates that the value of generative AI is contingent on the presence of complementary organizational capabilities. Without a flexible workforce, agile development routines, and responsive marketing processes, generative AI adoption may yield only narrow efficiency gains rather than enhanced product innovation performance.

From a practical standpoint, the findings imply that firms seeking to derive innovation benefits from generative AI should invest simultaneously in human resource flexibility, research and development agility, and marketing responsiveness. Adopting generative AI tools in a single function is unlikely to produce the synergy effects observed in this study. Managers should also pay attention to the design of digital platforms and workflows that enable cross-functional knowledge sharing, because the mediating mechanisms of knowledge integration and decision speed are central to realizing the benefits. Training programs that help employees use generative AI for cross-boundary communication and joint problem solving may be as important as the technology itself.

The study has several implications for theory. It extends the resource-based view by showing that generative AI can act as a complementary resource that enhances the value of intangible capabilities. It also advances dynamic capability theory by identifying specific coordination mechanisms

through which technology-enabled capability integration influences innovation outcomes. Furthermore, the study responds to calls for research that examines generative AI not as a general-purpose tool but as a context-dependent enabler of organizational processes. By linking generative AI to human resource flexibility, research and development agility, and marketing responsiveness, the research provides a nuanced account of how technology and organization co-evolve to produce innovation performance.

7. CONCLUSION AND IMPLICATIONS

This study set out to examine how generative AI enablement influences the synergistic effects of human resource flexibility, research and development agility, and marketing responsiveness on product innovation performance. The key findings confirm that the three organizational capabilities do not operate in isolation but form a configurational system whose joint effect on innovation is greater than the sum of individual contributions. More importantly, generative AI enablement significantly strengthens this joint effect by improving cross-functional knowledge integration and accelerating decision-making speed. The results demonstrate that generative AI should not be viewed as a direct source of innovation advantage but rather as an enabling infrastructure that amplifies the value of existing human and organizational capabilities. The study also provides evidence that the synergy mechanism operates through improved information flow and faster coordination, offering a more precise understanding of how technology and organization interact to produce superior product innovation outcomes.

The theoretical contributions of this research are threefold. First, the study extends the resource-based view by showing that generative AI can act as a complementary resource that enhances the value of intangible organizational capabilities. The findings support the argument that technology creates competitive advantage only when it is combined with other firm-specific resources that are difficult to imitate. Second, the research advances dynamic capability theory by specifying the coordination mechanisms through which technology-enabled capability integration influences innovation performance. Rather than treating dynamic capabilities as abstract firm-level routines, the study identifies knowledge integration and decision speed as concrete processes that connect generative AI to product innovation. Third, the study contributes to the emerging literature on generative AI in management by shifting attention from single-function applications to cross-functional synergy. This configurational perspective addresses a significant gap in prior research, which has largely examined AI effects on human resources, product development, or marketing in isolation.

The practical implications for managers are substantial. The findings suggest that firms seeking innovation benefits from generative AI should invest simultaneously in workforce flexibility, agile development practices, and responsive marketing systems. Deploying generative AI tools in only one function is unlikely to generate the synergy effects observed in this research. Managers should design digital platforms and workflows that facilitate cross-functional communication and shared access to AI-generated insights. Training programs

should emphasize the use of generative AI for boundary-spanning communication and joint problem solving, not merely for task automation. Leaders should also monitor the mediating conditions of knowledge integration and decision speed, as these processes determine whether generative AI investments translate into measurable product innovation gains. A balanced approach that aligns technology adoption with organizational capability building is therefore essential.

From a policy perspective, the findings support initiatives that encourage firms to adopt generative AI in ways that enhance organizational coordination rather than simply replace labor. Policymakers should consider supporting training programs that develop employee capabilities for AI-enabled collaboration across functions. Industry standards and guidelines could be developed to promote responsible AI adoption that complements human judgment and cross-functional teamwork. Public funding for research on AI and organizational innovation should prioritize studies that examine systemic effects rather than isolated productivity metrics. In addition, policies that foster digital infrastructure and data sharing among firms may help smaller enterprises access generative AI tools and develop the complementary capabilities needed to benefit from them.

8. LIMITATIONS AND FUTURE RESEARCH

This study has several limitations that should be acknowledged when interpreting the findings. First, the cross-sectional research design limits the ability to draw causal inferences. Although the theoretical model proposes directional relationships, the data cannot rule out reverse causality or reciprocal effects between generative AI enablement and organizational capabilities. Second, the use of subjective performance measures based on managerial assessments may introduce bias, even though reliability and validity tests were conducted. Objective indicators such as new product sales growth or patent counts would strengthen confidence in the results. Third, the sample may not fully represent all industry contexts, and the magnitude of the moderating effects could vary across sectors with different innovation rhythms or regulatory environments. Fourth, although common method bias was assessed and found to be negligible, the reliance on survey data from key informants means that some degree of shared method variance may persist. Fifth, the measurement of generative AI enablement captures the general extent of AI use across functions but does not distinguish among different types of generative AI tools or the intensity of their use in specific tasks. As generative AI technologies evolve rapidly, the validity of current measurement instruments may decline over time. Sixth, the study does not account for potential negative effects of generative AI, such as overreliance on AI-generated suggestions, erosion of employee skills, or unintended biases in cross-functional communication.

Future research should address these limitations through longitudinal designs that track the co-evolution of generative AI adoption and organizational capabilities over time. Such designs would allow scholars to examine causal ordering and

to identify whether initial investments in human resource flexibility and development agility lead to greater generative AI benefits or vice versa. Studies using objective performance data from company records would complement survey-based findings and reduce concerns about perceptual bias. Comparative research across multiple countries and industries would enhance the generalizability of the results and reveal boundary conditions related to institutional and cultural contexts.

Future work should also develop more nuanced measures of generative AI enablement that capture the specific functions, intensity, and quality of AI use. Qualitative case studies could provide deeper insight into the micro-processes through which generative AI facilitates cross-functional knowledge integration and decision speed. Experimental or quasi-experimental designs might isolate the causal effect of generative AI deployment on team coordination and innovation outcomes. Researchers could also investigate potential moderators such as organizational culture, leadership style, digital maturity, and industry dynamism that may condition the effects observed in this study. Finally, future studies should explore possible downsides of generative AI-enabled synergy, including information overload, algorithmic bias, and the erosion of tacit knowledge, to provide a more balanced understanding of how generative AI shapes product innovation performance.

9. REFERENCES

- [1] Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99 – 120.
- [2] Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509 – 533.
- [3] Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21(10 – 11), 1105 – 1121.
- [4] Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*, 27(2), 237 – 263.
- [5] Bhatt, G. D., & Grover, V. (2005). Types of information technology capabilities and their role in competitive advantage: An empirical study. *Journal of Management Information Systems*, 22(2), 253 – 277.
- [6] Wright, P. M., & Snell, S. A. (1998). Toward a unifying framework for exploring fit and flexibility in strategic human resource management. *Academy of Management Review*, 23(4), 756 – 772.
- [7] Beltrón-Martín, I., Roca-Puig, V., Escrig-Tena, A., & Bou-Lluisar, J. C. (2008). Human resource flexibility as a mediating variable between high performance work systems and performance. *Journal of Management*, 34(5), 1009 – 1044.
- [8] Conboy, K. (2009). Agility from first principles: Reconstructing the concept of agility in information systems development. *Information Systems Research*, 20(3), 329 – 354.
- [9] Lee, G., & Xia, W. (2010). Toward agile: An integrated analysis of quantitative and qualitative field data on software development agility. *MIS Quarterly*, 34(1), 87 – 114.
- [10] Day, G. S. (2011). Closing the marketing capabilities gap. *Journal of Marketing*, 75(4), 183 – 195.
- [11] Jayachandran, S., Hewett, K., & Kaufman, P. (2004). Customer response capability in a sense-and-respond era: The role of customer knowledge process. *Journal of the Academy of Marketing Science*, 32(3), 219 – 233.
- [12] Chandy, R. K., & Tellis, G. J. (2000). The incumbent's curse? Incumbency, size, and radical product innovation. *Journal of Marketing*, 64(3), 1 – 17.
- [13] Atuahene-Gima, K. (2005). Resolving the capability – rigidity paradox in new product innovation. *Journal of Marketing*, 69(4), 61 – 83.
- [14] Brynjolfsson, E., & McAfee, A. (2017). The business of artificial intelligence. *Harvard Business Review*, 95(4), 3 – 11.
- [15] Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review*, 96(1), 108 – 116.
- [16] Ransbotham, S., Kiron, D., Gerbert, P., & Reeves, M. (2017). Reshaping business with artificial intelligence. *MIT Sloan Management Review*, 59(1), 1 – 17.
- [17] Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... & Wright, R. (2023). Opinion Paper: “ So what if ChatGPT wrote it? ” Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642.
- [18] Choudhury, P., Allen, R. T., & Endres, M. G. (2023). Generative AI and the future of work: A strategic framework for HR. *Human Resource Management Review*, 33(4), 100975.
- [19] Wang, P., & Wang, X. (2024). Generative artificial intelligence and firm innovation: The moderating role of organizational agility. *Journal of Business Research*, 175, 114567.

[20] Roberts, N., & Grover, V. (2012). Leveraging information technology infrastructure to facilitate customer

agility: An empirical investigation. Journal of Management Information Systems, 28(4), 231 – 270.