INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ECONOMICS & MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 13, Issue 1, (2024) E-ISSN: 2226-3624

Assessing the Metric of Innovation Speed Across Varied Industries and Time Periods: A Thorough Review

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To Link this Article: http://dx.doi.org/10.6007/IJAREMS/v13-i1/20678 DOI:10.6007/IJAREMS/v13-i1/20678

Published Online: 15 Ferbruary 2024

Abstract

This study focusses on fully analysing the standards of measurement for innovation speed within various industries and over different periods.The clear conclusion is that within each industry, the differences in performance are not solely attributed to unique factors across industries. So, thisstudy thoroughly compare and contrast different measures throughout such scrutinize the dominant ones.These data not only provide theoretical sources of an accurate way to industry for setting on measuring its innovation pace but also serve as valuable benchmark associated with future research in relevant fields.Finally, this paper highlights the main goal of supporting industry members and scholars to develop better tools by contributing to a more effective impact.

Keywords: Innovation Speed, Varied Industries, Varied Time Periods, Metric, Review

Introduction

Measurement of speed in innovation is an important component that helps to capture organizational agility and ensure competitive advantage during the modern day industry.With the evolving landscape, gaining a clear view of how they measure innovation gives organizations an opportunity to navigate changes effectively.This research paves the way for a thorough analysis of various standards across different industries that have been used in determining innovation speed.While variations are emergent by nature, determined within the realm of industry-related realities; nonetheless a common consensus develops in each sector highlighting the need for powerful evaluation methodologies. The exploration of the subtle complexities surrounding innovation speed measurements makes this research a foundational theory for industries to tumble in stride with their innovativeness.In addition, it works toward providing a valuable benchmark for scientists embarking on followup research in related disciplines.This review, therefore, seeks to clarify the standards that guide innovation speed gauging and paves for improvement in regards theoretical understanding alongside practical application at all times when carrying out studies related with evolution concerning innovative affairs.

Research Methodology

This study takes a comprehensive approach to investigate the standards for measuring innovation speed across different sectors and historical periods. The research methodology involves an extensive literature review to ensure a robust understanding of the chosen topic. The conceptual framework creation encompasses the definition of hype trend characteristics and associated antecedents, rooted in creative process factors like social settings or values challenging established norms within globally influenced institutions. While direct quantitative data from industry experts and in-depth interviews are not utilized, qualitative insights drawn from the literature supplement the findings. This qualitative input adds depth to the analysis, capturing nuanced details that may be overlooked in a purely quantitative investigation. In the course of a specific and detailed comparison, four notable indicators emerge. Firstly, the speed of new idea generation is identified as a significant aspect representing innovation pace. Another crucial indicator is the realization rate for innovative concepts—how swiftly they can be transformed into tangible products or services. Two other markers are time and speed in developmental process leading to creation of novel items bringing them finally on marketplace leaving off experimental stage. The inclusion of a temporal dimension, considering variations before and after significant events, contributes to a nuanced understanding of the enduring relevance and adaptability of these indicators. Acknowledging limitations related to scope constraints and reliance on existing literature, the study suggests future research directions, urging a more expansive exploration of industry-specific factors and qualitative methodologies to enrich the discourse on innovation speed dynamics.

Overview of Innovation Speed

Innovation has emerged as a central driver of economic growth and competitiveness in today's dynamic business environment. However, the pace at which innovations are developed and brought to market has gained increasing attention in academic and industrial circles (Acharya et al., 2020; Narayanan et al., 2023; Wang et al., 2023). To a large extent, innovation is the most predominant theme in contemporary debates related to economic expansion and continuous organizations performance as observed present business landscape.In an age of rapid technological advancements and dynamic market landscapes this velocity has mastery experiences a turn precipitous to maintain the competitive advantage and objective sustainability (Wu et al., 2022; Haar & O'Kane, 2023).

Because of Figure1, these academic articles on innovation teeth have seen a marked increase in motivation and the recognition that this concept is important.Interestingly, innovation speed has gained critical importance in the contemporary world where both people and companies are always linked globally.1 It is one of these factors that determine a product success an organization's competitiveness on industries level as well national economy performance (Milan et al., 2020; Liu et al., 2023). The capacity to quickly come up, create and deliver new ideas products or services has become not only a preference attribute but also an indisputable necessity in the global business sector.Though there are a lot of advantages in accelerating the rate of innovation, such opportunities have their attendant challenges.Intellectual property conflict, data privacy and technological risk may be obstacles to innovation.

Finally, rapid innovation means that not everyone can keep up with technological changes contributing to the widening societal gaps (Ren et al., 2023). Therefore, the speed of developing innovations has a leading significance in modern business and economics (Wang

& Wang, 2012; Zhang et al., 2020; Si et al., 2023). It impacts on a firm's competitive and adaptability, with the effects extending to national and world economies.However, rapid innovation is driven by the many driving force factors including digital technology, globalization competitive pressure; entrepreneurial culture and government support (Mostafiz et al., 2021; Yao et al., 2021).

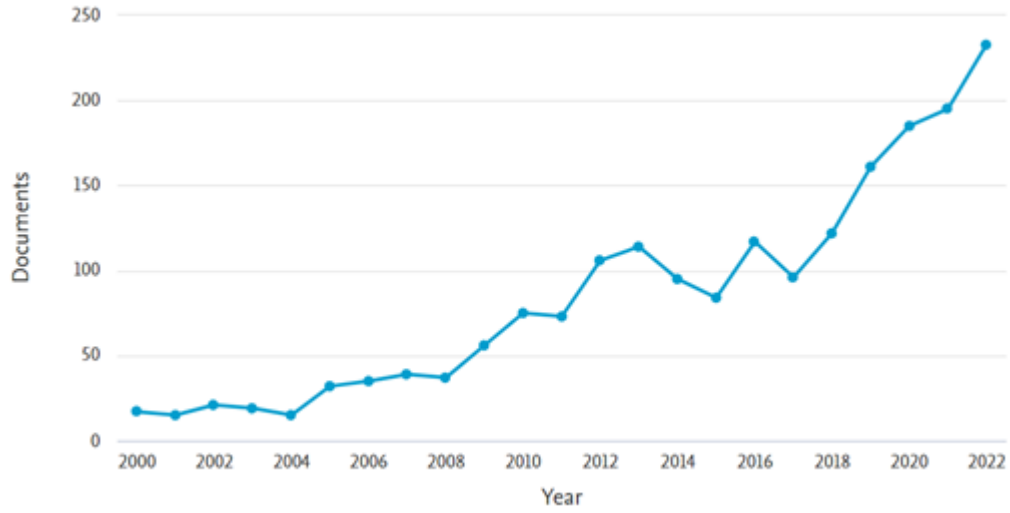

Figure 1. Number of Documents per year Related to Innovation Speed （source from Scopus ）

Dimensions of Innovation Speed

This study makes an innovative contribution through the chunking of its analysis into discrete time intervals. This division is based on the consideration that innovation dynamics are different in terms of time horizons, primarily related to distinguishing pre-2019 and post-2019 epochs. The year 2019 was selected as an inflection point due to the disruptive nature of COVID-19 pandemic's impact worldwide. This single event had a profound impact on numerous industries and forced them to proactively or reactively implement an accelerated process of innovation. By singling out the post-2019 period as a separate category, this study intends to capture unique innovation responses that were inspired by this defining moment. This temporal stratification enhances the representativeness of the study, allowing for a more pronounced contrast in innovation speed between different industries during disparate timeframes.

Pre-2019

In their study Carbonell & Rodríguez-Escudero (2009), researchers discovered that top management support, cross-functional communication, and a supportive organizational culture have a positive impact on innovation speed. However, this effect diminishes in high-tech turbulence. They recommend giving priority to these factors while considering uncertainty. Innovation speed was evaluated based on three criteria: time effectiveness, time efficiency, and industry-relative timing (adapted from (Cooper and Kleinschmidt, 1994; Akgün and Lynn, 2002; Kessler and Bierly, 2002). Similarly, Goktan and Miles (2011) defined "innovation speed" as the pace at which new products or projects are developed and introduced, measuring an organization's ability to implement innovative ideas. Their study explores factors influencing innovation speed at project and organizational levels, utilizing a

composite scale with items from multiple sources, including (Kessler and Chakrabarti, 1996; Hult et al., 2002).

Furthermore, Wang and Wang (2012) conducted a study examining the influence of knowledge sharing on innovation and performance. Their results revealed that a mixture of explicit and implicit practice was consistent to improve innovation and productivity.In particular, explicit sharing shows higher influence on the pace of innovation and commercial success.Besides that, Ellwood et al (2017) explored these themes in the context of high-tech enterprises and assessed innovation speed costs product qualityand also discusses products innovativeness together.Through its impact on cost and quality, their research revealed that innovation speed is highly significant to project success.This effect is contextual to the level of product innovativeness.In case of radical innovation, they suggest that firms should change with various levels of innovations; investing in knowledge to lower costs and futile attempts involving adjustment as per market changes.

Thus, Le and Lei (2018) tested the interactions among organizational learning; innovation speed, quality of innovations which are two mechanisms that lead to competitive advantages by studying them in Chinese firms.The studies show that innovation speed and quality lead to positive differential results in terms of differentiation, as well as a cost leadership outcome.Essentially, organizational learning is a moderating element between these associations showing that innovation and knowledge play an important part in strengthening competitive advantage of Chinese firms.

Later on, Dong et al (2019) focused on its role in influencing innovation competence.Their results reveal that knowledge related to and for clients directly impacts the success of this new market.On the other hand, customer knowledge has relatively low power.In addition, the quality of innovation has been found to be a good predictor with some chance that speed as well as sustainability mediates between customer knowledge management and performance in all newly service market. The study suggests the necessity for additional research to address limitations, such as sample size and geographical scope. In a similar vein, Hutahayan and Yufra (2019) investigated the connection between innovation speed and SME competitiveness within Malang's food industry. Their findings emphasize the critical role of rapid innovation in enhancing SME competitiveness, aligning with the concept of creative destruction. Government influence is found to be limited, and future research should focus on specific types of processed foods within the innovation typology to provide more precise recommendations. As of 2019, Table 1 summarizes the indicators of innovation speed for various industries, based on the literature discussed above.

Table 1
Summary of the literatures on innovation speed metrics Pre-2019

Authors	Industry or Objective	Indicators
(Carbonell & Rodríguez-Escudero, 2009)	Encompasses six diverse industries: food, chemical, plastic, mechanical equipment, electrical equipment, and transportation	1. Project Completion Time 2. Adherence to Industry Norms 3. On-Time Project Launch 4. Relative Project Speed
(Banu Goktan & Miles, 2011)	High-tech industry	1. Innovation Process Duration Reduction 2. Satisfaction with Innovation Speed 3. Efficiency of Innovation Process 4. Potential for Faster Innovation Process 5. Project Completion Speed Comparison 6. Innovation Project Schedule Adherence
(Wang & Wang, 2012)	High-tech firms	1. Novel Idea Generation Speed 2. New Product Launch Speed 3. New Product Development Speed 4. New Process Development Speed 5. Problem Solving Speed
(Shan et al., 2016)	New Ventures	1. Innovation Speed 2. New Product Introduction Speed 3. Development On-time Performance
(Ellwood et al., 2017)	High-tech firms	1. Top Management Satisfaction 2. On-Time or Ahead-of-Schedule Launch 3. Completion Time vs. Industry Norms 4. Faster than Major Competitor
(Le & Lei, 2018)	Chinese firms	1. Novel Idea Generation Speed Relative to Competitors 2. New Product Launch Speed Relative to Competitors 3. New Product Development Speed Relative to Competitors 4. New Process Development Speed Relative to Competitors 5. Problem Solving Speed Relative to Competitors
(Dong et al., 2019)	No specific industry	1. Novel Idea Generation Speed 2. New Service Launch Speed 3. New Service Development Speed 4. New Technology and Equipment Adoption Speed 5. Problem Solving Speed

(Hutahayan & Yufra, 2019)	Food Small and Medium Enterprises	1. Innovation Idea Realization Speed 2. New Product Market Launch Speed 3. Innovation Speed Improvement Over the Past Three Years

Post-2019

Subsequently, in a study conducted by Acharya et al (2020), the impact of loosely coupled systems on innovation speed in service organizations is examined. The authors discovered a positive relationship between loosely coupled systems, characterized by modular interconnected processes and flexible partnerships, and innovation speed. They argue that these systems provide enhanced flexibility and adaptability, thereby contributing to accelerated innovation.

Moving forward, Iqbal (2021), investigated the impact of knowledge management enablers, including top management knowledge value, a knowledge-oriented culture, and knowledge-based rewards, on innovation performance in higher education institutions. The influence of these enablers on speed and quality was found to be positive, with the knowledge-sharing process mediating this relationship. However, it should be mentioned that the results are from a sample population of HEIs in Pakistan – a developing country. Consequently, the results of this study may not be completely applicable to HEIs in other countries having different cultural backgrounds and organizational designs as well as climate. Additionally, Wang et al. (2021) investigated the relationship between IC, innovation speed ,innovation quality and firm performance. The research found that IC had an overall positive effect on both innovation speed and quality, which in turn resulted to a favorable outcome regarding firm performance. Additionally, the study recommended that future research should include data from different industries to confirm finding results and obtain more objective measurements of firm performance. It also suggested considering the mediating effects of contextual factors, which would include HRM strategy.

In their study, Ojha et al (2022) stressed the ability to perform social exchange capacity(CSE), which enables knowledge sharing and enhances innovation speed in supply chain organizations.The results showed the positive relationships among CSE, knowledge sharing and innovation velocity. This indicates that executives in B2B service firms acquired useful information for strategies formulation of how to manage their skills related resources from these findings. Along with that, Khoa and Anh (2023) studied supply chain integration, innovation speed as well as the impact on performance in demand uncertainty was conducted by them.In developing country, this research tested empirically whether supply chain integration increases innovation speed and improves performance of supply chains.In addition, the study recommended that policymakers could resolve discrepancies about cross-function limits and utilize supply chain combining plans to achieve essential assets, improvement limitations as well as improve quicken both innovation speed also use of SCP.In addition, the research provided valuable real-life information for business leaders and consumers.It focused on the importance of both internal and external integration for success rates in innovation speed as well as methods to overcome demand uncertainty through supply chain networks.

Afterwards, in research of Liu et al (2023), some relevant conclusions are provided regarding the mechanisms and institutional settings that help manufacturing companies to utilize their digital innovation profitably. This research significantly contributes to the digital innovation literature by elucidating the mechanisms that connect the adoption of digital innovations with

a manufacturing firm's overall performance. Furthermore, the study explores the interplay between digital innovations and institutional affordances, shedding light on the importance of the intellectual property rights (IPR) protection system in driving innovation. As a result, the findings underscore the underlying mechanisms that facilitate the appropriation of value from digital innovation for manufacturing firms. Drawing from the aforementioned literature and other relevant sources, this study compiles the indicators of innovation speed for the year 2020 and beyond, as presented in Table 2.

Table 2
Summary of the literatures on innovation speed metrics Post-2019

Author and Year	**Industry or Objective**	**Metrics**
(Guo et al., 2020)	High-Tech Small and Medium-Sized Enterprises	1. Innovation Speed 2. New Product Introduction Speed 3. Development On-time Performance
(Arshi et al., 2021)	Emerging Market Economies	1. Speed of Ideation to Prototype 2. Speed of Prototype to Market Launch 3. Speed of Customer Feedback 4. Speed of Product/Service/Process Redesign 5. Speed of Technical/Technological Learning
(Wang et al., 2021)	High-Tech Firms in China	1. Speed of Generating Innovative Ideas 2. Speed of New Product Launching 3. Speed of New Product Development 4. Speed of New Process Implementation 5. Speed of Problem Solving
(Ojha et al., 2021)	US Service Firms in a Business	1. New Service Development Speed 2. New Feature Development Speed 3. Service Delivery Technology Development Speed
(Hoonsopon & Puriwat, 2020)	Food & Beverage, Pharmaceutical, and Biotechnology Industries in Thailand	1. New Product Development Time 2. New Product Development Speed Satisfaction 3. Efficiency of Shortened Development Process 4. Future New Product Development Speed Expectation 5. Competitive New Product Development Speed
(Wang et al., 2023)	High-Tech Firms in China	1. Novel Idea Generation Speed 2. New Product or Service Launch Speed 3. New Product or Service Development Speed 4. New Process Development Speed 5. Problem Solving Speed
(Milošević et al., 2021)	Serbian Banking Industry	1. Novel Idea Generation Speed 2. New Product Launch Speed 3. New Process Development Speed 4. Problem-Solving Speed

(Wu et al., 2022)	Digital Platform	1. Project Schedule Adherence 2. On-Time Project Completion 3. Project Objective Achievement 4. Development Speed Improvement
(Wu et al., 2022)	SMEs	1. Project Duration Adherence 2. On-Time Project Completion 3. Project Objective Achievement 4. Development Speed Improvement
(Ojha et al., 2022)	Service Businesses in the USA	1. New Service Development Speed 2. New Feature Development Capability 3. Service Delivery Technology Development Capability
(Haar & O'Kane, 2023)	New Zealand Private Sector Firms	1. Technological Innovation Adoption 2. Design to Prototype/Service Progress 3. Outdated Product/Service Elimination 4. New Ideas Encouragement
(Adusei et al., 2023)	Manufacturing Firms in Ghana	1. Novel Idea Generation Speed 2. New Product Launch Speed 3. New Product Development Speed 4. New Process Development Speed 5. Problem Solving Speed
(Liu et al., 2023)	Manufacturing Firms	1. Innovation Speed Relative to Competitors 2. Reputation for New Product Introductions 3. Development On-time Performance

Innovation Speed Indicators: Statistics and Analyses

Building upon the preceding overview, we have undertaken a preliminary selection of measurement factors pertaining to innovation speed, as the Table 3 shown. The leading factors in various industries encompass new idea generation speed, innovation idea realization speed, new product development time and speed, new product launch speed, problem-solving speed, new technology and equipment adoption speed, new service development speed, new process development speed, and development on-time performance. In tandem, a comprehensive statistical analysis of these factors has been conducted, and the specific data is presented in the table below. This in-depth examination serves to provide a nuanced understanding of the prominence and variance of these indicators across diverse industries. Simultaneously, this study offers a comprehensive account of the main indicators that represent innovation speed - new idea generation rate; realization speed of innovative ideas; development time and velocity regarding introducing new products and introduction to market velocity for innovations.

Table 3
Key Indicators of Innovation Speed

Factors / Authors	new idea generation speed	Innovation Idea Realization	New Product Development	New Product Launch Speed	Problem Solving Speed	New Technology and	New Service Development	New Process Development	On-time Development	Industry or Case Study
(Wang & Wang, 2012)	√	√	√		√			√		High-tech firms
(Shan et al.,			√						√	New Ventures
(Le & Lei,	√			√	√			√		Chinese firms
(Dong et al.,	√				√	√	√			No specific industry
(Hutahayan & Yufra, 2019)	√	√	√	√						Food Small and Medium Enterprises
(Guo et al.,			√						√	High-Tech Small and
(Arshi et al.,			√	√	√	√		√		SME Manufacturing
(Ojha et al.,		√				√	√			US Service Firms in a
(Hoonsopon & Puriwat, 2020)	√	√	√	√						Food & Beverage Industries in
(Wang et al.,	√	√	√	√	√					High-Tech Firms in China
(Milošević et al., 2021)	√	√		√	√					Serbian Banking Industry
(Ojha et al.,						√	√			Service Businesses in the
(Haar & O'Kane, 2023)	√	√				√				New Zealand Private Sector Firms
(Adusei et al.,	√	√	√	√	√					Manufacturing Firms in
Total	9	8	8	7	7	4	3	3	2	

New Idea Generation Speed

It is true that New Idea Generation Speed is a very important measure of an organisation's or company innovation speed. This indicator demonstrates the speed at which new and innovative concepts emerge inside an organization (Adusei et al., 2023). This can result in a more agile and adaptive innovation channel (Dong et al., 2019; Milošević et al., 2021).

Innovation Idea Realization Speed

Another measurement of the organization's innovation velocity is Innovation Idea Realization Speed. It quantifies how fast an organization is able to convert innovative thoughts into a physical product, service or solution that gets deployed in the market itself or within. One should find the equilibrium between innovation idea generation speed and innovation idea realization speed (Hutahayan & Yufra, 2019). Though ideation speed may be important, failure to capitalize on these ideas within an organization is one of the factors resulting in

frustrations and wastes. With that in mind, an effective innovation strategy should provide balance between the speed of ideas generation and realization to receive good results (Hutahayan & Yufra, 2019).

New Product Development Time and Speed

Since these are the new product development time and speed is a key indicator of how fast an organization innovates; that is, developing new products today takes less time than before (Hoonsopon & Puriwat, 2020). The time a company takes to create, develop and introduce an innovation into the market is measured by this metric. Attempts at the reduction of new product development time and speed may involve process optimization, streamlined decision-making, cross functional collaboration as well as agile development methodologies usage. new product development time and speed is a important measure of an organization's innovation rate Companies that is good at producing new products quickly respond to today's fast business world (Milošević et al., 2021; Adusei et al., 2023; Wang et al., 2023).

New Product Launch Speed

New product launch speed is an essential measure of innovation pace in any organization. It measures how quickly a firm can launch a new product from development stage to market entry (Wang & Wang, 2012). To improve new product launch speed, organizations may sometimes find it necessary to concentrate on the optimization of product release procedures and team communication as well as how they can adopt an agile methodology for development and management projects. Moreover, the adoption of digital tools and technologies can speed up different stages in launching a product. New Product Launch speed is also an important measure that reflects the ability of the organization to innovate and respond quickly to new product launch speed, market needs. Firms that lead the pack at this juncture stand a better chance of getting ahead in an increasingly competitive and dynamic corporate world (Adusei et al., 2023).

Results and Discussions

The study conducted a detailed comparison of innovation speed indicators within various industries and time frames, which led to pinpointing four universal signs recognizably recognized as key ones. These critical indicators represent the ideal form of innovation rate. The high speed at which new idea generation is taking place highlights the crucial role creative ideation processes play in facilitating innovation across different industries. Secondly, the performance of innovation idea realization where efficiency and speed is concerned reflects an execution strategy's effectiveness among varying industries. Third, the timeline and momentum of increased new product development shows how important quick product innovation and assimilation are. Finally, the identification of new product launch speed as a basic innovation driver shows that rapid market entry is an important factor for protecting competitiveness. As a result, this comparative analysis sheds light upon the importance of those indicators not only in our study but also all over these industries and different periods. Together these results provide a richer picture of the complex forces affecting innovation velocity through time in today's fast moving business world.

Conclusion

In summary, this study has provided a detailed analysis of innovation speed ratios for various industries and time frames. Through the comparative analysis, four predominant indicators

have been identified as central to the assessment of innovation speed: the new idea generation speed, innovation idea realization speed, industrial development time and degree as well as new product launching wall. Importantly, these measures have shown a remarkable significance throughout different industries that highlight their universality as well as their relevance in modern business dynamics. Creative ideation, time-efficient idea realization processes, short product development cycles and timely market entry have been reported as important themes. More importantly, the study's incorporation of a temporal dimension which takes into account differences in the pace of innovations before and after significant events such as global pandemic 2019 helps to offer insights on an evolving nature regarding innovation practices. These results not only synthesize the essential factors but also highlight their timeless significance and applicability to surmount business dynamics constantly transforming while changing with time. Innovation speed dynamics insights gleaned from this study can guide practitioners, policymakers, and researchers toward innovation enhancement in their fields.

Limitations and Future Directions

Limitations

While this research provides considerable information about the nature of innovation velocity, it is necessary to mention some limitations that may influence one's ability to generalize and interpret conclusions.

- First, the research area is limited to industries in question and may not cover all variations of innovation practice across different spheres. Furthermore, the use of reviewed works and a quantitative approach to calculating indicators can leave qualitative details that could provide for an alternative interpretation of innovation speed out.
- Heels, the dependence on literature in connection with both prevalent figures ignores brilliant qualities that can add more shading to innovation speed understanding.
- Second, the analysis of innovation acceleration is contextual and what might be perceived as indicators in certain environment may vary on their importance under another concept.However, the data on which this study is based refer to the status of available research up until knowledge cut-off date which can easily change due to dynamic innovation or invention that may have occurred not been reflected in this analysis.
- Another limitation is in not considering some of the factors related to a specific industry that could lead to variation in innovation speeds, yet were left unaddressed by the selected literature.Other studies will have to delve into these factors further and provide a wider perspective.
- Lastly, the focus on particular measures may miss other potential source of speed in innovation.This approach does not provide detailed information about the effects of organizational structures, leadership styles, or external environments on organizations because these factors may greatly influence innovation velocity in companies.

Future Directions

Based on gained insights, and several directions for further research can be outlined. Secondly, a broader consideration of industry-specific variables and their impact on the rate of innovation can contribute to understanding contextual dynamics as well. Considering the

intersection of organizational culture, leadership styles, and innovation acceleration could reveal intricate insights. Additionally, a longitudinal analysis that traces innovation tempo shifts over the course of time would lead to a more dynamic understanding of the topic. This type of analysis would allow researchers to detect trends, disruptions and emerging patterns that might not be obvious in a static one.

References

Acharya, C., Ojha, D., Patel, P. C., & Gokhale, R. (2020, 2020/08/01/). Modular interconnected processes, fluid partnering, and innovation speed: A loosely coupled systems perspective on B2B service supply chain management. *Industrial Marketing Management, 89*, 209-219. https://doi.org/https://doi.org/10.1016/j.indmarman.2019.05.007

Adusei, E., Demah, E., & Mensah, H. K. (2023). Does going intellectually green matter? Accentuating the role of eco-innovation speed and quality in a competitive post-Covid 19 emerging market. *International Journal of Innovation Science, ahead-of-print*(ahead-of-print). https://doi.org/10.1108/IJIS-01-2023-0019

Akgün, A. E., & Lynn, G. S. (2002). Antecedents and consequences of team stability on new product development performance. *Journal of Engineering and Technology Management, 19*(3-4), 263-286.

Arshi, T. A., Rao, V., Viswanath, S., & Begum, V. (2021). Measuring innovation effectiveness: a SEM-based cross-lagged analysis. *International Journal of Innovation Science, 13*(4), 437-455. https://doi.org/10.1108/IJIS-08-2020-0111

Banu Goktan, A., & Miles, G. (2011). Innovation speed and radicalness: are they inversely related? *Management Decision, 49*(4), 533-547.

Carbonell, P., & Rodríguez-Escudero, A. I. (2009). Relationships among team's organizational context, innovation speed, and technological uncertainty: An empirical analysis. *Journal of Engineering and Technology Management, 26*(1-2), 28-45.

Cooper, R. G., & Kleinschmidt, E. J. (1994). Determinants of timeliness in product development. *Journal of Product Innovation Management: AN INTERNATIONAL PUBLICATION OF THE PRODUCT DEVELOPMENT & MANAGEMENT ASSOCIATION, 11*(5), 381-396.

Dinh Khoa, V., & Mai Anh, N. T. (2023). Examining the Relationship Between Supply Chain Integration, Innovation Speed and Supply Chain Performance Under Demand Uncertainty. *Engineering Management Journal*, 1-16.

Dong, J. Q., Wu, W., & Zhang, Y. (2019, 2019/07/01/). The faster the better? Innovation speed and user interest in open source software. *Information & Management, 56*(5), 669-680. https://doi.org/https://doi.org/10.1016/j.im.2018.11.002

Ellwood, P., Grimshaw, P., & Pandza, K. (2017). Accelerating the innovation process: A systematic review and realist synthesis of the research literature. *International Journal of Management Reviews, 19*(4), 510-530.

Guo, F., Bo, Q., Tong, X., & Zhang, X. (2020, 2020/11/01/). A paradoxical view of speed and quality on operational outcome: An empirical investigation of innovation in high-tech small and medium-sized enterprises. *International Journal of Production Economics, 229*, 107780. https://doi.org/https://doi.org/10.1016/j.ijpe.2020.107780

Haar, J., & O'Kane, C. (2023). Understanding New Zealand firm innovation: exploring human resource factors by firm size and strength. *Journal of the Royal Society of New Zealand*, 1-18. https://doi.org/10.1080/03036758.2023.2180761

Hoonsopon, D., & Puriwat, W. (2020, 2021/02/01). THE ROLE OF LEADERSHIP BEHAVIOUR OF PROJECT MANAGER IN MANAGING THE FUZZY FRONT END IN THE DEVELOPMENT OF RADICAL AND INCREMENTAL INNOVATION. *International Journal of Innovation Management, 25*(02), 2150022. https://doi.org/10.1142/S1363919621500225

Hult, G. T. M., Ketchen Jr, D. J., & Nichols Jr, E. L. (2002). An examination of cultural competitiveness and order fulfillment cycle time within supply chains. *Academy of Management Journal, 45*(3), 577-586.

Hutahayan, B., & Yufra, S. (2019). Innovation speed and competitiveness of food small and medium-sized enterprises (SME) in Malang, Indonesia. *Journal of Science and Technology Policy Management, 10*(5), 1152-1173. https://doi.org/10.1108/JSTPM-12-2017-0071

Iqbal, A. (2021). Innovation speed and quality in higher education institutions: the role of knowledge management enablers and knowledge sharing process. *Journal of Knowledge Management, 25*(9), 2334-2360.

Kessler, E. H., & Bierly, P. E. (2002). Is faster really better? An empirical test of the implications of innovation speed. *IEEE Transactions on Engineering Management, 49*(1), 2-12.

Kessler, E. H., & Chakrabarti, A. K. (1996). Innovation speed: A conceptual model of context, antecedents, and outcomes. *Academy of Management Review, 21*(4), 1143-1191.

Le, P. B., & Lei, H. (2018). The effects of innovation speed and quality on differentiation and low-cost competitive advantage: The case of Chinese firms. *Chinese Management Studies*.

Liu, Y., Dong, J., Mei, L., & Shen, R. (2023). Digital innovation and performance of manufacturing firms: An affordance perspective. *Technovation, 119*, 102458.

Milan, E., Ulrich, F., Faria, L. G. D., & Li-Ying, J. (2020, 2020/08/08). Exploring the impact of organisational, technological and relational contingencies on innovation speed in the light of open innovation. *Industry and Innovation, 27*(7), 804-836. https://doi.org/10.1080/13662716.2020.1754170

Milošević, N., Dobrota, M., Dmitrović, V., & Barjaktarović Rakočević, S. (2021). Managerial perception of human capital, innovations, and performance: evidence from banking industry. *Inzinerine Ekonomika-Engineering Economics, 32*(5), 446-458.

Mostafiz, M. I., Hughes, M., & Sambasivan, M. (2021). Entrepreneurial orientation, competitive advantage and strategic knowledge management capability in Malaysian family firms. *Journal of Knowledge Management, 26*(2), 423-458. https://doi.org/10.1108/JKM-09-2020-0693

Narayanan, S., Nadarajah, D., Sambasivan, M., & Ho, J. A. (2023, 2023/09/03). Antecedents and outcomes of the knowledge management process (KMP) in Malaysian SMEs. *Journal of Small Business & Entrepreneurship, 35*(5), 697-723. https://doi.org/10.1080/08276331.2020.1818540

Ojha, D., Dayan, M., Struckell, B., Dhir, A., & Pohlen, T. (2022). Social exchange in buyer-supplier relationships and innovation speed: the mediating and moderating role of information sharing and knowledge channels. *Journal of Knowledge Management, ahead-of-print*(ahead-of-print). https://doi.org/10.1108/JKM-04-2022-0280

Ojha, D., Struckell, E., Acharya, C., & Patel, P. C. (2021). Managing environmental turbulence through innovation speed and operational flexibility in B2B service organizations. *Journal of Business & Industrial Marketing, 36*(9), 1627-1645. https://doi.org/10.1108/JBIM-01-2020-0026

Ren, K., Wang, Y., & Liu, L. (2023). Impact of Traditional and Digital Financial Inclusion on Enterprise Innovation: Evidence from China. *SAGE Open, 13*(1), 21582440221148097.

Shan, P., Song, M., & Ju, X. (2016). Entrepreneurial orientation and performance: Is innovation speed a missing link? *Journal of Business Research, 69*(2), 683-690.

Si, S., Hall, J., Suddaby, R., Ahlstrom, D., & Wei, J. (2023, 2023/01/01/). Technology, entrepreneurship, innovation and social change in digital economics. *Technovation, 119*, 102484. https://doi.org/https://doi.org/10.1016/j.technovation.2022.102484

Wang, Guo, F., & Zhang, Q. (2023). How does disruptive innovation influence firm performance? A moderated mediation model. *European Journal of Innovation Management, 26*(3), 798-820. https://doi.org/10.1108/EJIM-07-2021-0369

Wang, Z., Cai, S., Liang, H., Wang, N., & Xiang, E. (2021). Intellectual capital and firm performance: the mediating role of innovation speed and quality. *The International Journal of Human Resource Management, 32*(6), 1222-1250.

Wang, Z., & Wang, N. (2012). Knowledge sharing, innovation and firm performance. *Expert Systems with Applications, 39*(10), 8899-8908.

Wu, A., Song, D., & Liu, Y. (2022, 2022/10/01/). Platform synergy and innovation speed of SMEs: The roles of organizational design and regional environment. *Journal of Business Research, 149*, 38-53. https://doi.org/https://doi.org/10.1016/j.jbusres.2022.05.016

Yao, Q., Zeng, S., Sheng, S., & Gong, S. (2021). Green innovation and brand equity: moderating effects of industrial institutions. *Asia Pacific Journal of Management, 38*, 573-602.

Zhang, H., Zhang, X., & Song, M. (2020). Does knowledge management enhance or impede innovation speed? *Journal of Knowledge Management, 24*(6), 1393-1424. https://doi.org/10.1108/JKM-08-2019-0460