Available Online at www.e-iph.co.uk
Indexed in Clarivate Analytics WoS, and ScienceOPEN

E-B Environment - Behaviour Proceedings Journal

International Virtual Colloquium on Multi-Disciplinary Research Impact (3rd Series), MEE 2.0: International Conference of Logistics and Transportation (ICLT2022), Best Western i-City Shah Alam, Selangor, Malaysia, 05-06 Oct. 2022

e-IPH e-International Publishing House Ltd., United Kingdom

Determinants of Innovation Speed towards Innovation Performance among Factory Workers in Malaysia

Mohd Rizaimy Shaharudin[1], Wissawa Aunyawong[2], Bhuk Kiranantawat[2], Suhaibah Mokhtar[3]

[1] Smart Manufacturing Research Institute (SMRI), School of Mechanical Engineering, College of Engineering, Universiti Teknologi Mara,40450 Shah Alam, Selangor, Malaysia
[2] College of Logistics and Supply Chain, Suan Sunandha Rajabhat University, Nakhon Pathom, Thailand
[3] Faculty of Business and Management, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

rizaimy@uitm.edu.my, wissawa.au@ssru.ac.th, bhuk.ki@ssru.ac.th, suhaibah_95@yahoo.com
Tel: +6019-4482008

Abstract
The study aims to determine the relationships between the determinants of innovation speed and their impact on innovation performance among Malaysia's manufacturing industry employees. A purposive sampling technique was adopted, and 123 completed survey forms were received for further examination. The findings revealed that, except for autonomy, other determinants such as creativity, self-leadership, innovativeness, risk-taking, and proactiveness significantly impacted innovation speed. In addition, innovation speed significantly influenced the employees' innovation performance. Future research should focus on other factors that may influence the speed of innovation in different industries and how they affect different levels of the organizations.

Keywords: Creativity; Innovativeness; Innovation Speed; Performance; Self-leadership

DOI https://doi.org/10.21834/ebpj.v7iSI9.4316

1.0 Introduction

Today, the company's performance can be boosted by the firm's ability to increase its innovation due to the increasingly competitive level and shorter product life cycle (Pisano, 2015). Innovation becomes a core objective for all organizations because the competitive environment is growing aggressively. Its implication spans the sustainability business model by supporting the recent comprehensive triple-bottom-line initiatives (Shaharudin et al., 2022). Companies that continuously initiate innovation efforts could improve firm performance by mitigating the competitive and sustainability pressures from the local and international markets.

Significantly, companies need talented top-level employees in organizations to produce innovative products in great demand. Employees are obligated to be innovative and creative and to know how to challenge the productions of others. Besides that, the important thing that faces an organization to market its products in the whole wide market is competitiveness. Being left behind in making innovative processes or producing attractive products can affect the organization negatively. Concerning this, Karabulut (2015) verifies that new product development and process innovation are important strategies to increase an organization's market share and performance. Innovation performance is something that an organization can achieve and succeed when the company's profit from years to years increases. For the industry to advance in the global value chain, more innovation is required. The capacity of a company to expand innovation to keep up with an ever-increasing degree of competition and shorten product life cycles can greatly boost the company's performance. However, despite the significance of innovation in industrial output, The Star in 2016 claimed that innovation in Malaysia is still sluggish owing to a lack of finance, insufficient assistance from the business sector in R&D, and a shortage of

DOI https://doi.org/10.21834/ebpj.v7iSI9.4316

researchers. Furthermore, the New Straits Times noted in 2018 that the nation's new enterprises are not innovating. In the past seven years, only 16 per cent of new items have been presented by new firms. In this scenario, most Malaysian businesses are thought to be too sluggish to innovate and focus on adopting technology rather than developing it. In the latest article, Guie (2020) advocated the issue as Malaysia's economy lags behind Vietnam and Indonesia due to a lack of innovation. Therefore, this study resonates with the investigation to empirically identify the determinants (creativity, self-leadership, innovativeness, autonomy, risk-taking, and proactiveness) of innovation speed and its impact on innovation performance among employees of the manufacturing industry in Malaysia. The paper starts with a literature review and hypotheses development, followed by the development of a conceptual model. methodology, data analysis and discussion. The study ends with a conclusion and suggestions for future research.

2.0 Literature Review

2.1 Innovation performance

Wang and Lin (2012) defined innovation performance as the accomplishment of innovation through organizational activities per desired targets that can be measured by several financial, technical and non-technical methods. They added that innovation performance depends on the innovative abilities of an organization and the employees' internal and external dealings. Furthermore, firms' innovation performance depends increasingly on the information produced outside of the firm boundaries (Sofka & Grimpe, 2014). According to Chobotová and Rylková (2014), most of the broad empirical studies on the relationship between innovation and performance prove that the relationship was positive. For example, an organization needs to expand exposure to market risk and improve costs, employee dissatisfaction or unwarranted changes to improve innovation performance. The success of innovation depends on the number of successful projects to the total number of initiated innovative projects. In this context, the effectiveness of innovations means the real involvement of innovative projects towards reciprocity of the impact between business organisations and the employees in transferring knowledge, career opportunities and on-the-job learning (Zainoddin et al., 2020). It is critical for all organizations to achieve the goals of effective and efficient performance (Chumiran et al., 2021).

2.2 Creativity and Innovation Speed

Creativity is outlined because of the ability to supply novel, potentially valuable ideas about firms' products, practices, services, or procedures, as advocated by Shalley and Gilson (2004). The organizational and creative theorist has defined that an individual's creativity is main in itself and can be conceptualized as a needed first stage or precondition compulsory for innovation. Pratoom and Savatsomboon (2012) stated that creativity directly affects innovation because day-to-day employee communications may lead to knowledge. Thus, this study hypothesizes that:

H1: There is a positive effect of creativity towards innovation speed.

2.3 Self-Leadership and Innovation Speed

For developing an innovation, explicit that creativity alone is inadequate (Anderson et al., 2004). Having a precise stage of internal force is the main to persevere them face challenges in creative work (Shalley & Gilson, 2004.) According to Pearce and Manz (2005), self-leadership is crucial for organizations that require continuous innovation. The process of influencing or leading oneself through specific behavioural and psychological methods is defined as self-leadership (Manz et al., 2014). In relation to this, employee attributes can speed up innovation by generating fresh ideas for improving products, services and processes (Shaharudin et al., 2018). Thus, the following hypothesis has been formulated:

H2: There is a positive effect of self-leadership towards innovation speed.

2.4 Innovativeness and Innovation Speed

Innovativeness is the capability of a replacement innovation to affect the firm's existing promoting resources, technological resources, talents, information, capabilities, or approach (Tajeddini, 2011). Organizations hold innovativeness as an important factor for achievement in today's business environment in every field of business. According to Shan et al. (2016), innovativeness is found to increase, not decrease, the innovation speed. They discovered that technological novelty and product newness are the main sources that improve new product development. It means process innovation can bring many advantages to respond speedily to market demands. Thus, this study hypothesizes that:

H3: There is a positive effect of innovativeness towards innovation speed.

2.5 Autonomy and Innovation Speed

Autonomy is an independent action of a person or group to get an idea or vision and bring it through to completion (Lumpkin & Dess, 1995). From an organizational perspective, autonomy refers to organizational associates acting and making decisions independently. Autonomy refers to structured members acting and creating choices severally from an organizational context. It is the one way that makes workers feel inspired to interact in new venture creation and exploitation (Kuratko, 2017). On the other hand, large firms foster autonomy through the delegation of authority to operating units. Operating unit authority can better access accurate and timely information for resolving problems and delegating authority, also rising team members' motivation, ownership, and commitment to reaching project goals (Shan et al., 2016). Overall, delegating authority provides flexibility and eventually facilitates innovation speed. Hence, given the above discussion, the proposed hypotheses are as follows:

H4: Autonomy has a positive effect on innovation speed.

2.6 Risk-Taking and Innovation Speed

Employee risk-taking characterizes a willingness to withstand uncertainty and faults as one explores new ideas, advocates unconventional or unpopular positions, or tackles challenging problems without obvious solutions to increase the likelihood of accomplishment (Neves & Eisenberger, 2014). The previous study consistently indicated that innovation speed is influenced by risk-taking. An intense investment that has been faced by top management shows that risk-taking is "the degree to which managers are willing to make large and risky resource commitment, that is, those which have a reasonable chance of costly failures (Shan et al., 2016). From this definition, there are two effects, both of which are required for understanding commitment to success and prospects for a positive outcome (Ali et al., 2012). Thus, the following hypothesis has been formulated:

H5: Risk-taking has a positive effect on innovation speed.

2.7 Proactiveness and Innovation Speed

Proactive employees are of great value to organizations. On the other hand, a proactive personality is a unique characteristic that shows individual, team, organizational levels and job performance with the tendency in proactive at the workplace. They depend on their initiative rather than waiting to be encouraged by their supervisors, co-workers, or customers (Raub & Liao, 2012). Firms with proactiveness characteristics are the first ones that introduce new products or services. The second firm enters a new market to be a pioneer as the first entrant and to achieve success via proactiveness, as has been found by some researchers (Miles et al., 1978). Firms that have the will to be a leader and the foresight to seize new opportunities, even if they are not always the first to enter the market, are called proactive. Besides that, proactiveness has an inverted U-shaped effect on innovation speed by increasing opportunities and taking initiatives (Shan et al., 2016). Thus, this has led to the following hypothesis:

H6: Proactiveness has a positive effect on innovation speed.

2.8 Innovation Speed and Innovation Performance

Organization efficiency is based on the new product development processes and capabilities of accelerating new products to market (Kessler & Bierly, 2002). Innovation speed has become a highly valued organizational resource by ensuring constant reduction in the product life cycle. According to Chen et al. (2010), organizations are adapting to the shorter product life cycle and the fast-changing environment by modifying their method to build competitive advantages by providing the most value for the lowest, which means the most value for the lowest cost at the least amount of time. Based on Cankurtaran et al. (2013), one stream has been devoted to identifying the driver of faster product development by focussing on the performance implications of development speed. They discovered a conceptual framework on which innovation speed can be affected by strategic orientation factors such as product quality, development cost and project success in the organization. Past studies found that innovation speed and innovation performance produced mixed results (Swink et al., 2006). Thus, the following hypothesis has been formulated:

H7: Innovation speed has a positive effect on innovation performance.

2.9 Development of the Conceptual Model

The study has proposed the research framework as depicted in Figure 1. Based on the literature review, the study suggested that creativity, self-leadership, innovativeness, autonomy, risk-taking, and proactiveness influenced innovation speed, which eventually affected innovation performance.

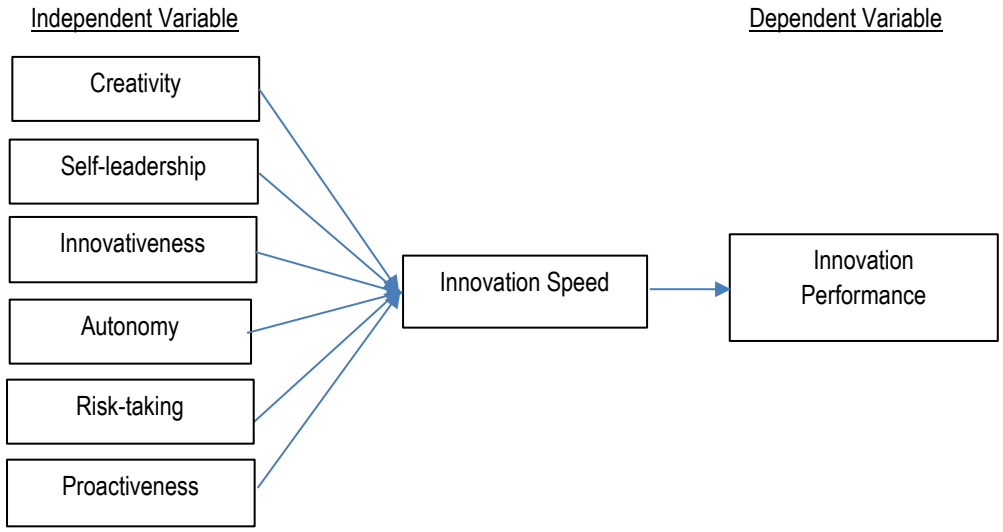

Figure 1: Conceptual Framework

3.0 Methodology

3.1 Research Design

The study was quantitative in nature with the utilisation of a cross-sectional study, on which the data was gathered through a survey over a period of four months. A purposive sampling method was used to select suitable respondents for the study. One hundred fifty questionnaires were distributed to production operators of the manufacturing industry in several industrial areas in the Northern States of Peninsular Malaysia. However, only one hundred twenty-three complete questionnaires were returned for further analysis. The study has chosen employees from Production Department as the population due to the manufacturing sector being the largest sector and the greater pace of innovation as compared to other sectors in Malaysia. Smart-PLS software package was utilised to analyse the data of the study. In addition, the SPSS was used to analyse the demographic profile of each respondent.

3.2 Sample profile

The majority of the respondents were female (67.5%), age bracket respondents between 18 to 29 years old (67.5%), Malay race (79.7%), working experience between 1 to 5 years in the manufacturing industry (48.8%), secondary school educational background (63.4%) and serving the Production Department (88.6%).

3.0 Data Analysis

4.1 Assessment of the Measurement Model

In assessing the measurement model, the reflective constructs were evaluated to determine the acceptance of the reliability and validity of the constructs. Table 1 shows that the composite reliability of all of the constructs in the study exceeded the 0.7 threshold, as suggested by Hair et al. (2013).

Table 1. Reliability and Convergent Validity

Construct	No. of Items	Factor Loadings	Composite Reliability	AVE
Autonomy	5	0.669-0.812	0.871	0.547
Creativity	4	0.755-0.849	0.877	0.640
Innovation Performance	6	0.681-0.791	0.879	0.548
Innovation Speed	4	0.787-0.862	0.887	0.663
Innovativeness	4	0.600-0.800	0.810	0.519
Proactiveness	4	0.709-0.825	0.848	0.583
Risk-taking	4	0.722-0.878	0.863	0.614
Self-leadership	5	0.711-0.768	0.858	0.547

Moreover, the factor loadings of above 0.6 achieved by all constructs indicated that the reliability of each item was greatly achieved (Hair et al., 2010). Subsequently, the convergent validity was assessed, and the AVE results of all of the constructs being above 0.5 indicated that the convergent validity had reached a satisfactory level (Hair et al., 2013).

The discriminant validity was assessed by comparing the square root of the AVE and the inter-correlations with the other model constructs (Fornell & Larcker, 1981). The results in Table 2 revealed that the square root of the AVE for each construct was higher than the inter-correlations between the other constructs. Hence, the results demonstrated adequate discriminant validity with the compliance of adequate convergent validity and discriminant validity. It is evidenced that the model was sufficient to further evaluate its structural model.

Table 2. Fornell-Larker Criterion Analysis for checking Discriminant Validity

	1	2	3	4	5	6	7	8
Autonomy	**0.758**							
Creativity	0.307	**0.800**						
Innovation Performance	0.104	0.292	**0.740**					
Innovation Speed	0.318	0.515	0.319	**0.814**				
Innovativeness	0.168	0.526	0.155	0.503	**0.720**			
Proactiveness	0.306	0.295	0.315	0.569	0.459	**0.764**		
Risk-taking	0.221	0.292	0.208	0.583	0.291	0.508	**0.783**	
Self-leadership	0.328	0.536	0.306	0.485	0.450	0.298	0.204	**0.739**

4.2 Assessment of the Structural Model

The goal of the assessment of the structural model of this study was to investigate the relationships of the determinants of innovation speed towards innovation performance. The predictive relevance measures developed by Stone (1974) and Geisser (1975) have been utilised in this study to assess the model fit. In this case, the cross-validated redundancy value was computed based on the blindfolding process in the PLS, as suggested by Chin (2010). The results showed that the predictive capability values for all of the exogenous variables were above zero. This meant that the model was useful for making predictions and fit well.

The subsamples of 1,000 samples were used to simulate testing of smaller sample sizes. The significance level of the path coefficients in the structural model was assessed, with the t-values for a one-tailed t-test being 1.645 (5% of the significance level) and

2.326 (1% of the significance level) (Hair et al., 2010). Based on the summary of the results presented in Table 3, there were positive and significant paths for creativity towards innovation speed (path coefficient = 0.138, p 0.05), followed by self-leadership towards innovation speed (path coefficient = 0.170, p 0.05), innovativeness towards innovation speed (path coefficient = 0.144, p 0.05), risk-taking towards innovation speed (path coefficient = 0.341, p 0.01), proactiveness towards innovation speed (path coefficient = 0.223, p0.01) and innovation speed towards innovation performance (path coefficient = 0.319, p0.05). However, autonomy towards innovation speed (path coefficient = 0.052, p>0.05) was not supported by the relationships. The details of the path analysis results are shown in Table 3. The results indicated that except for H4, all of the hypotheses (H1, H2, H3, H5, H6, H7) were supported.

Table 3. Path Analysis Result

Hypothesis	Path	Beta	T-statistics	Decisions
H1	Creativity>Innovation speed	0.138	1.659*	Supported
H2	Self-leadership>Innovation speed	0.170	1.753*	Supported
H3	Innovativeness>Innovation speed	0.144	1.673*	Supported
H4	Autonomy>Innovation speed	0.052	0.542	**Not supported**
H5	Risk-taking>Innovation speed	0.341	4.494***	Supported
H6	Proactiveness>Innovation speed	0.223	2.719**	Supported
H7	Innovation speed>Innovation performance	0.319	2.478**	Supported

5.0 Discussion

The results indicated that creativity significantly influenced innovation speed. This is supported by Anderson et al. (2004) study by which innovation speed cannot be developed if only supported by creativity. This result is also supported by a study by Pratoom & Savatsomboon (2012) that the person who can respond positively to any challenge, besides having a high level of ambition, self-determination, and ability to work under pressure, will be a more successful worker in an organization. The findings verified that creativity is the first step and precondition required for an individual's innovation.

Other than that, the result of this study demonstrated a significant relationship between self-leadership and innovation speed. According to Pearce and Manz (2005), self-leadership is necessary to continue innovation. In addition, self-leadership is very important to get a successful outcome because it can encourage positive behaviour. Besides that, Carmeli et al. (2006) advocated that self-leadership skills are an antecedent that positively affects innovative speed. Innovation in the workplace is a complex process that entails difficulties, obstacles, and frustration.

Autonomy is unimportant because the company does not give freedom to employees to voice their opinions and make certain decisions. On the other hand, lack of commitment and time allocation for information means problems persist. It means that lack of communication is why autonomy does not affect the organization. Reilly and Scott (2014) state that evidence regarding the relationship between autonomy and innovative performance is mostly conceptual. It means that the effect of autonomy is insignificant on innovation speed because autonomy provides an indirect or mediating role rather than direct effects. The impact is also substantiated, especially when the manager decides and solves problems, and each manager determines decision-making but not by the lowest-ranked employees.

Besides that, the result of this study demonstrated a positive relationship between risk-taking and innovation speed. According to Neves and Eisenberger (2014), employee risk-taking is a willingness to endure ambiguity and errors in searching for new ideas by taking unconventional or unpopular positions and tackling extremely challenging problems without knowing the solutions for job completion. Employee risk-taking includes engaging in a wide range of activities, such as trying new procedures, accepting difficult tasks with a high probability of failure, or admitting mistakes. In this case, the risk-taking may facilitate innovation speed because of the resource commitment from the top management that allows product and process designers to be less concerned about conserving resources and use them mainly to accomplish innovative endeavours in the organization.

The outcome of the findings shows that there is a significant relationship between proactiveness and innovation speed. Employees' proactivity needs to flourish in every one of the employees by creating positive outcomes rather than waiting to respond when asked to do so. Starting from the beginning of production, employees must take proactive action to maintain the products' quality and ensure that the production process runs smoothly without any defects. In this case, the higher level of proactiveness is related to the higher level of effort in innovation and the ability to identify opportunities to resolve any working-level issues. An organization needs to be a leader and have the foresight to seize new opportunities, even if it is not the first organization to enter the market. Instead of focusing on quality or price, the main factor of speed shows a new way to get into the market. Besides that, innovation speed has become a key to the relationship between innovation speed and innovation performance. Although they were not exposed to any formal training, they could adapt to the working environment through a briefing on the first day of work in the organization. Innovation speed can be a successful innovation performance when combined with the employee's creativity, self-leadership, innovativeness and others. Other than that, companies with a faster innovation rate can grab whatever advantages the company holds and achieve a competitive advantage in the market. Innovation speed influences the decision-making process's success or failure (Shan et al., 2016).

6.0 Conclusion

This study has examined the determinants of innovation speed towards innovation performance. Innovation speed is determined by creativity, self-leadership, innovativeness, autonomy, risk-taking, and proactiveness. Nevertheless, only five determinants can improve

innovation speed in manufacturing firms. Except for autonomy, which showed insignificant relationships, creativity, self-leadership, innovativeness, risk-taking, and proactiveness all significantly impacted innovation speed. It is suggested that organisations support their employees by embracing high belief and trusting them to improve innovation speed performance. Future research is suggested to explore other variables that can potentially impact the innovation speed among employees in Malaysia. Prospective researchers are proposed to investigate innovation speed's impact on Malaysia's diverse manufacturing industries. The results are expected to be more conclusive and better understand how innovation speed influences employees' innovation performance.

Acknowledgement

The authors would like to express their gratitude to Universiti Teknologi MARA (UiTM) Shah Alam Selangor, Malaysia, for their assistance and ReNeU UiTM for the publication incentive provided through PYPB and MEE 2.0 Programs.

References

Ali, S. M., Shaharudin, M. R., & Anuar, A. (2012). The Association between Job Positions, Work Experience and Career Satisfaction: The Case of Malaysian's Academic Staff. *Asian Social Science, 8*(10), 35-44.

Anderson, N., de Dreu, C. K. W., & Nijstad, B. A. (2004). The routinization of innovation research: A constructively critical review of the state-of-the- science. *Journal of Organizational Behavior*, *25*, 147–173.

Cankurtaran, P., Langerak, F., & Griffin, A. (2013). Consequences of new product development speed: A meta-analysis. *Journal of Product Innovation Management*, *30*(3), 465–486.

Carmeli, A., Meitar, R., & Weisberg, J. (2006). Self-leadership skills and innovative behavior at work. *International Journal of Manpower, 27*(1), 75-90.

Chen, J., Damanpour, F., & Reilly, R. R. (2010). Understanding antecedents of new product development speed: A meta-analysis. *Journal of Operations Management*, *28*(1), 17–33.

Chin, W.W. (2010). *Bootstrap Cross-Validation Indices for PLS Path Model Assessment*. In: Esposito Vinzi, V., Chin, W., Henseler, J., Wang, H. (eds) Handbook of Partial Least Squares. Springer Handbooks of Computational Statistics. Springer, Berlin, Heidelberg.

Chobotová, M., & Rylková, Ž. (2014). Measurement of Innovation Performance. *International Journal of Social, Behavioral, Educational, Economic and Management Engineering*, *8*(7), 2068–2073.

Chumiran, M. H., Zainal Abidin, S., Rahim, W. N., & Vermol, V. V. (2021). Cognitive Ergonomics of Formgiving as UnstructuredApproaches in Furniture Design Practice. *Environment-Behaviour Proceedings Journal, 6*(SI5), 27-32.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Geisser, S. (1975) The predictive sample reuse method with applications. *Journal of the American Statistical Association, 70*(350), 320–328.

Guie, L. H. (2020). Malaysia Still Lagging Behind. Bernama. Retrieved from https://www.bernama.com/en/thoughts/news.php?id=1875164

Hair, J. F., Ringle, C. M., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis (Seventh)*. Prentice-Hall International Inc.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2013). *A Primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks: Sage.

Karabulut, A. T. (2015). Effects of Innovation Types on Performance of Manufacturing Firms in Turkey. *Procedia - Social and Behavioral Sciences*, *195*, 1355–1364.

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.

Kuratko, D. F. (2007). Entrepreneurial Leadership in the 21st Century. *Journal of Leadership & Organizational Studies*, *13*(4), 1–11.

Lumpkin, G., & Dess, G. (1995). Simplicity as a strategy-making process: The effects of stage of organizational development and environment on performance. *The Academy of Management Review*, *38*(5), 1386–1407.

Manz, C. C., Pearce, C. L., Manz, C. C., Shropshire, J., Kadlec, C., Stewart, G. L., … Manz, C. C. (2014). Self-Leadership: A Multilevel Review. *Journal of Management*, *34*(2), 130–140.

Miles, R. E., Snow, C. C., Meyer, A. D., & Coleman Jr, H. J. (1978). Organizational strategy, structure, and process. *Academy of Management Review*, *3*(3), 546–562.

Madanoglu, M., Altinay, L., & Wang, X. L. (2016). Disentangling the effect of family involvement on innovativeness and risk taking: The role of decentralization. *Journal of Business Research, 69*(5), 1796-1800.

Neves, P., & Eisenberger, R. (2014). Perceived organizational support and risk taking. *Journal of Managerial Psychology*, *29*(2), 187–205.

Pearce, C. L., & Manz, C. C. (2005). The new silver bullets of leadership: The importance of self- and shared leadership in knowledge work. *Organizational Dynamics*, *34*(2), 130–140.

Pisano, G. P. (2015). You Need an Innovation Strategy. Harvard Business Review. Retrieved from https://hbr.org/2015/06/you-need-an-innovation-Strategy

Pratoom, K., & Savatsomboon, G. (2012). Explaining factors affecting individual innovation: The case of producer group members in Thailand. *Asia Pacific Journal of Management*, *29*(4), 1063–1087.

Raub, S., & Liao, H. (2012). Doing the right thing without being told: Joint effects of initiative climate and general self-efficacy on employee proactive customer service performance. *Journal of Applied Psychology*, *97*(3), 651–667.

Reilly, M., & P. Scott, P. S. (2014). Subsidiary driven innovation within shifting MNC structures: Identifying new challenges and research directions. *Technovation, 34*(3), 190-202.

Shaharudin, M. R., Hassam, S. F., Akbar, J., Nik Abdul Rashid, N. R., & Mohd Noor, N. F. N. (2018). Determinants of ISO 9001 Quality Management System Effectiveness Amongst Electrical and Electronics Manufacturing Firms in Malaysia. *International Journal for Quality Research, 12*(3), 655-676.

Shaharudin, M. R., Mohamad Mokhtar, A. R., Wararatchai, P., & Legino, R. (2022). Circular Supply Chain Management and Circular Economy: A Conceptual Model. *Environment-Behaviour Proceedings Journal, 7*(SI7), 31-37.

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.

Sofka, W., & Grimpe, C. (2014). *Markets for Technology and the Importance of Firm-Specific Search for Innovation Performance*. The Academy of Management Annual Meeting 2014, Philadelphia, United States.

Stone, M. (1974). Cross-validatory choice and assessment of statistical predictions. *Journal of the Royal Statistical Society, Series B (Methodological), 36*(2),111–147.

Swink, M., Talluri, S., & Pandejpong, T. (2006). Faster, better, cheaper: A study of NPD project efficiency and performance trade-offs. *Journal of Operations Management*, *24*(5), 542–562.

Tajeddini, K. (2011). The effects of innovativeness on effectiveness and efficiency. *Education, Business and Society: Contemporary Middle Eastern Issues*, *4*(1), 6–18.

Wang, R. T., & Lin, C. P. (2012). Understanding innovation performance and its antecedents: A socio-cognitive model. *Journal of Engineering and Technology Management, 29*(2), 210–225.

Zainoddin; A. I., Azlan Amran, A., & Shaharudin, M. R. (2020). The effect of social capital on the effectiveness of community development programmes in Malaysia. *International Journal of Information and Decision Sciences, 12*(3), 227 – 245.