

Business Intelligence & Analytics and Its Effect on Indonesia's Startup Performance

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ABSTRACT

Business intelligence is the most developed subject in strategic management research; however the connection to startup performance has not been much conducted in research. This research examines the model for startups in Indonesia, considering that investment for startups in Indonesia is one of the largest in the region of Asia Pacific. The research used SEM-PLS to analyze the relationship between business intelligence, innovation, network learning, and startup performance. The unit of analysis used was the startup registered in the Indonesian startup database, published by the Indonesian Creative Economy Agency (Badan Ekonomi Kreatif). It was 992 startups registered, and there were sent to 885 emails to startups that included emails. Just 31 startups replied to the research questionnaire, resulting in a 3.5 percent response rate. The findings of this study show that while business intelligence does not appear to have an impact on startup success, it does have an impact on network learning. Innovativeness has been shown to have an effect on startup success in Indonesia. The paper helps to explain the position of business intelligence. Of these, only 31 startups filled out the research questionnaire or a response rate of 3.5%. Result of this study find that business intelligence is not proven to have an influence on startup performance, but it does affect network learning. What is proven to have an influence on startup performance in Indonesia is innovativeness. The paper allows a better understanding of the role of business intelligence, network learning, and innovativeness for startups. This improved understanding can help executives or managers of startup in making their decisions. In contrast to the results of previous research on the effect of business intelligence on startup performance, the results obtained from this study do not support this relationship. This research paves the way for the need for confirmation of the effect of business intelligence on startup performance, as well as further understanding of how the mechanisms are going on in it.

Keywords: Business Intelligence, Network Learning, Innovativeness, Startup, Indonesia.

1. INTRODUCTION

Competitive intelligence, also known as business intelligence, market intelligence, customer intelligence, business intelligence & analytics, is the most developed subject in strategic management research (Wheelen, Thomas et al., 2017). But the connection to startup performance has not been much researched (Caseiro & Coelho, 2019; Hoppe et al., 2009).

From the perspective of resource-based view (RBV), knowledge is one of the assets, and even then it becomes the main asset to win the current competition, giving birth to knowledge-based view (KBV). In KBV, the main asset for a company is knowledge in formulating its competitive advantage (Villar et al., 2014). Knowledge enhancement can result from business intelligence,

because the processes involved in knowledge production are search and recombination (Colombelli et al., 2013). Aside from business intelligence, the process of acquiring and utilizing knowledge can also be obtained from network learning, related to the condition that startups rely a lot on external sources to obtain their knowledge (Weerawardena et al., 2014). Moreover, related to performance, innovation is one of the keys to improving company performance in a rapidly changing era (R. Calantone et al., 2003; Vnoučková, 2018; Z. Wang & Wang, 2012).

From the perspective of dynamic capability (DC), corporate capability is important in competing. The factor that contributes the most to increasing competition in a tri-industry is the increase in competitor capabilities

(Wheelen, Thomas et al., 2017), so the role of intelligent business becomes very important for companies to be able to know the capabilities of competitors. Business intelligent is an important part of environmental scanning for most companies (Wheelen, Thomas et al., 2017).

Research indicates that business intelligence has a strong relationship with company performance (Wee & Leow, 1994; Wheelen, Thomas et al., 2017), however the mechanism of this relationship in the context of startup has not been much studied. In addition, startup is not a small version of the company. Startups are born in an uncertain environment with limited resources, so it is important for startups to do environmental scanning accurately in determining their business strategies, one of which uses business intelligence & analytics.

The mechanism of business intelligence relations to startup performance in startups in Europe occurs through innovation and network learning (Caseiro & Coelho, 2019). This study examines the model for startups in Indonesia, considering that investment for startups in Indonesia is one of the largest in the Asia Pacific Region (CB Insight, 2020).

Literature Review

Business Intelligence & Analytics

Competitive intelligence (CI) is a formal program of gathering information on a company's competitors (Wheelen, Thomas et al., 2017). Often called business intelligence, it is one of the fastest growing fields within strategic management.

Business intelligence can be seen as a general term, which includes various activities, processes and technologies to collect, store, analyze and disseminate information to improve decision making (Wanda & Stian, 2015).

Business intelligence has three basic objectives, namely to provide a general understanding of the industry and competitors, identify weak areas of competitors, and predict potential actions from competitors that endanger the company's position in the market (David & David, 2017). Optimal business intelligence practice combines internal and external information so as to support business performance (Baltzan, 2020).

But all this, including the idea of data and information analysis, becomes managerial that is concise and useful for science (Al-Shubiri, 2012). In the field of management, the concept has been studied under a different title (Adidam et al., 2012). Some authors use the term business intelligence to convey the concept of "environmental scanning", which focuses on how managers "scan" the environment of their organizations; others refer to intelligence or competitive analysis (Dishman & Calof, 2008; Gudfinnsson et al., 2015;

Shollo & Kautz, 2010; Wright & Calof, 2006) focus more on competitors, strengths, weaknesses, and their behavior; while others mention technology intelligence which is oriented to technological dynamics (Adidam et al., 2012; Božić & Dimovski, 2019a; Hannula & Pirttimaki, 2003; Pellissier & Nenzhelele, 2013). This practice allows companies to turn data into useful knowledge (Hoppe et al., 2009), and then make better and faster decisions (Chang et al., 2015; Hannula & Pirttimaki, 2003) to improve business performance and support decision making at all levels of the organization, for example, strategic, tactical and operational levels (Gudfinnsson et al., 2015; Negash & Gray, 2008).

However, the large streams of data in different formats generated through high-velocity communication technologies, referred to as "big data", led to one of the biggest technological disruptions in the field of business intelligence (Agarwal & Dhar, 2014).

Although different definitions of BI&A appear in the literature, we understand BI&A as referring to the technologies, techniques, systems, processes and applications used to acquire, store, analyse and transform business and market data and information into relevant knowledge for use in making better business decisions (Božić & Dimovski, 2019b)

Innovativeness

Innovation refers to the tendency of companies to engage in and support new ideas, experiments, and creative processes that can produce new products, services, or technological processes (Lumpkin & Dess, 1996; Shan et al., 2016).

Competition is a process driven by innovation (Hill et al., 2017). Innovative performance is also seen in the literature as one of the most important drivers of other aspects of organizational performance and encourages the formation of organizational learning dynamics (Gunday et al., 2011). Firms innovativeness is conceptualized from two perspectives. The first sees it as a behavioral variable, i.e., the rate of innovation adopted by firms. The second sees it as a willingness to change (R. J. Calantone et al., 2004).

The ability to innovate is recognized as one of the determining factors for an organization to survive and succeed (C. L. Wang & Ahmed, 2004). More innovation can be a significant driving factor for creating value and will help respond to customer needs, develop new capabilities that enable to achieve and maintain better performance or increasingly complex superior profitability, competitive environment and fast-changing (R. J. Calantone et al., 2004; Cepeda-Carrion et al., 2012; Z. Wang & Wang, 2012). The literature conveys that the ability of innovation as one of the most important determinants in company performance is supported by many people in empirical studies (R. J. Calantone et al.,

2004; Prajogo, 2016). Innovative companies, creating and introducing new products and technologies, can produce better economic performance and are a source of economic growth (Wiklund & Shepherd, 2003).

Network Learning

Network learning capability is defined as the company's capacity to build, integrate, and reconfigure technical and non-technical knowledge generated through external links and institutions (Weerawardena et al., 2014).

Collective learning is the core competency of a company which is the root of its competitiveness (Furrer, 2016). External networks influence the ability of companies to mobilize environmental resources, attract customers, and identify entrepreneurial opportunities (Lee et al., 2001). Learning occurs when people share data, information, and knowledge. Knowledge can be felt as meaningful information obtained by understanding, awareness, and familiarity through study, investigation, observation or experience over a certain period of time. Knowledge generated through learning and learning new abilities helps companies to compete effectively, be resilient, and grow (Hitt et al., 2001) The ability of organizations to identify, capture, create, share, or gather knowledge has become the spotlight and therefore has become the most important element in the production and competitive advantage. (Z. Wang & Wang, 2012)

Startup Performance

Performance is the ability to achieve goals with expectations or superior. The performance is multidimensional and that the comparison of performance with competitors reveals important information (Birley & Westhead, 1990). The concept of organizational performance involves a variety of perspectives, time periods, and criteria (Gerschewski & Xiao, 2015). In research of (Caseiro & Coelho, 2019) three different types of approaches are used to measure organizational performance. The first relates to financial performance, which is a performance-based indicator of performance and is considered the narrowest conception of business performance. The second conceptualization includes dimensions of financial and operational performance, combining non-financial results actions (for example, product markets), such as market share, introduction of new products, and marketing effectiveness and internal process results. These operational factors can ultimately contribute to financial performance. The broadest conceptualization of performance is related to organizational effectiveness.

In research of (Wiklund & Shepherd, 2003), performance appraisal is done by asking a re-sponsor to compare the development of their own company over the past 3 years relative to their two most important

competitors for 10 different performance dimensions: sales, growth, revenue growth, employee growth, net profit margins, product / service innovation, process innovation, adoption of new technology, product / service quality.

Conceptual Framework and Hypotheses

The research model that will be tested follows the model proven by the research of (Caseiro & Coelho, 2019) as follow:

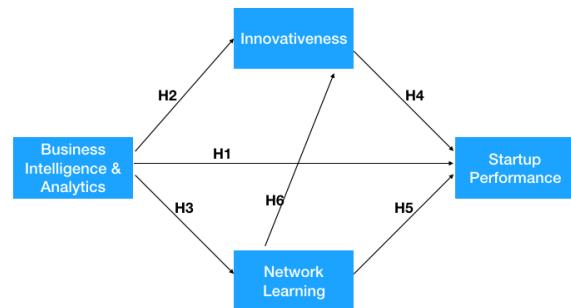


Figure 1. Conceptual framework

H1: Business intelligence & analytics have positive influence on startup performance

H2: Business intelligence & analytics have positive influence on innovativeness

H3: Business intelligence & analytics have positive influence on network learning

H4: Innovativeness have positive influence on startup performance

H5: Network learning have positive influence on startup performance

H6: Network learning have positive influence on innovativeness

2. METHODS

This research use quantitative method to analyze the relationship between business intelligence, innovation, net-work learning, and startup performance. The unit of analysis used is the startup registered in the Indonesian startup database, published by Badan Ekonomi Kreatif. Of the 992 startups registered, e-mails were sent to 885 startups that included e-mails. Of these, only 31 startups filled out the research questionnaire or a response rate of 3.5%.

The data obtained were then analyzed using PLS analysis, given the small sample size. The analysis in this study uses SmartPLS 3.0 software.

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1 Assessment of Measurement Models

After an analysis using SmartPLS, we found that some indicators had an outer loading value of less than 0.7 so that the indicators were removed and the model was retested. After retesting, it was found that all indicators had an outer loading value of more than 0.7 so that further analysis was performed.

Internal reliability was analyzed using the composite reliability reference and values obtained from all variables were more than 0.6 so that all variables were stated to be reliable.

Discriminant validity was evaluated using crossloading values (for indicator levels) and Fornell-Larcker Criteria (for variable levels). The results obtained for cross loading and AVE values met the criteria so that all variables were declared valid based on fig.2.

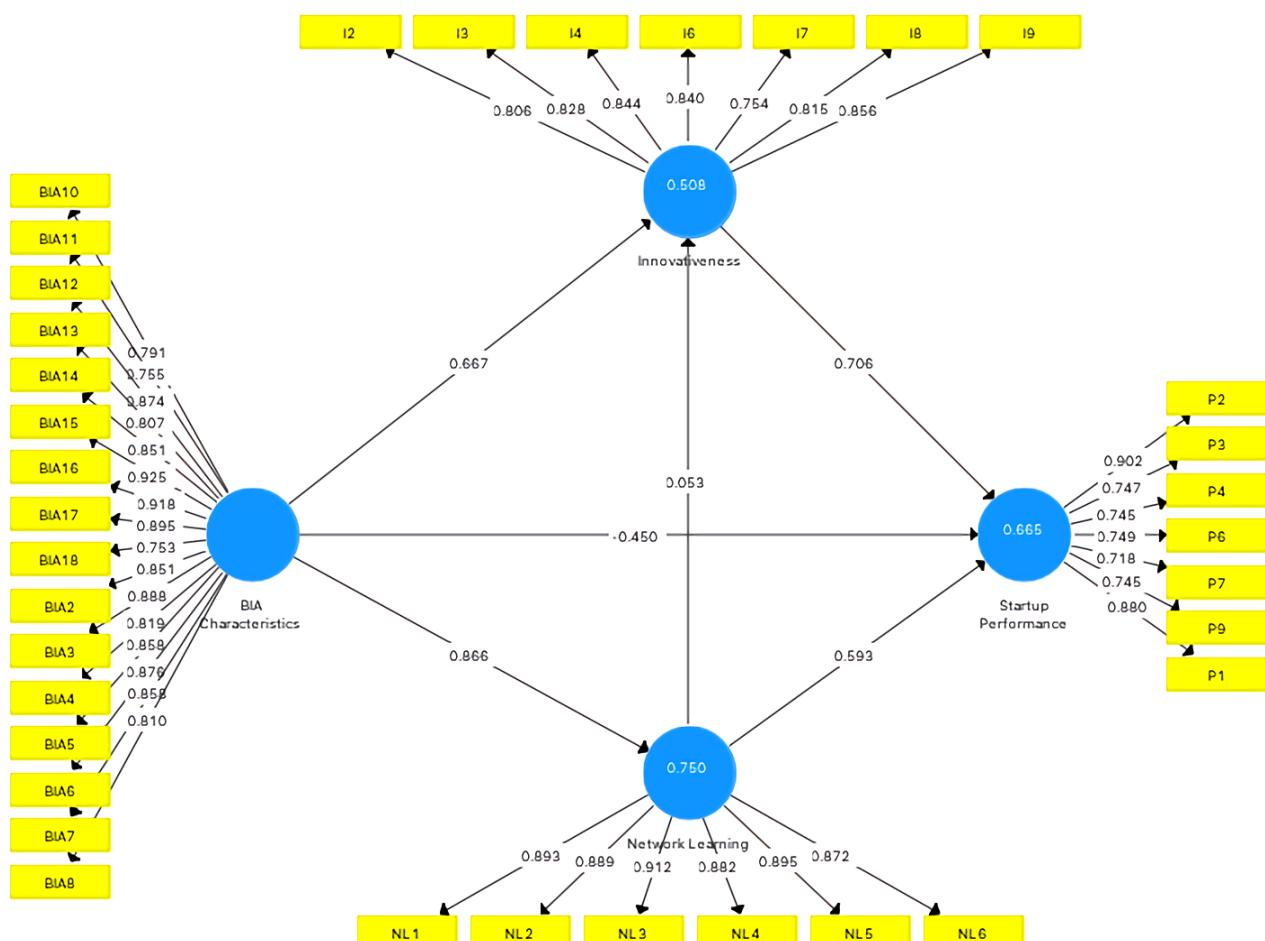


Figure 1 PLS test result

3.1.2 Asesmen Model Struktural

The coefficient of determination of the model can be seen from adjusted R² so that the evaluation was more accurate, and found overall the three variables were able to explain the variable startup performance of 62.7%, based on table 1.

Table 1. Determination Coefficient

Variable	Adjusted R ²
<i>Business Intelligence & Analytics</i>	-
<i>Innovativeness</i>	0.473
<i>Network Learning</i>	0.741
<i>Startup Performance</i>	0.627

To test the hypothesis analyzed using the rule of thumb, viz (1) if the coefficient or direction of the variable relationship (indicated by the original sample value) matched what was hypothesized, and (2) if the statistical t-value was greater than 1.703 (one-tailed) and (3) the probability value (p-value) was less than 5%. The results of testing the complete hypothesis can be seen in the following table. From the above hypotheses, the research model, based on table 2.

Table 2. Hypotheses Test Result

Hypotheses	Path Coefficient	T statistics	P value	Description
<i>H1</i>	-0.450	0.850	0.198	Not supported
<i>H2</i>	0.667	1.554	0.060	Not supported
<i>H3</i>	0.866	11.131	0.000	Supported
<i>H4</i>	0.706	2.392	0.009	Supported
<i>H5</i>	0.593	1.309	0.096	Not supported
<i>H6</i>	0.053	0.122	0.451	Not supported

3.2 Discussion

Business intelligence & analytics are basically the capabilities of the company. In the context of startups, they need to use and analyze big data to improve their business decisions. The results obtained from this study found that business intelligent & analytics did not have a significant effect on startup performance. Whereas in other literature found that business intelligence & analytics have an influence on startup performance [2,27,42]. This might be due to the fact that most of the samples (68%) are startups that have never received funding from outsiders, so that in terms of performance they have not been effective and their business intelligence & analytics activities have not been optimal. In addition, the variables used may need to be replaced in future studies, not focusing on characteristics, but on the use of business intelligent & analytics.

Business intelligent & analytics have a significant influence on network learning, reinforcing findings [2,6]

while the effect of business intelligence on innovativeness was found to have an insignificant effect. It is different from what was found by reference [2]. The relationship between intelligent business & analytics with innovation can occur indirectly, so it needs to be further investigated for mediating variable, for example absorptive capacity. While the business intelligence & analytics relationship to network learning needs to be a concern for practitioners because of startups as a company rely on innovation, the main resource is knowledge. Thus, it is necessary to increase the knowledge generated from the network, one of them is by utilizing business intelligent & analytics which is more effective.

Innovativeness is proven to have a significant influence on startup performance. The reinforces the results of reference [36], but differs from the findings of reference [2]. The relationship is relevant to the context of startups as companies that rely or are based on innovation. Network learning has no significant effect on startup performance or on innovation. These two relationships differ from what was discovered by reference [2]. The influence of network learning on startup performance and innovation may not be a direct influence, so it is necessary to examine the mediation variables such as membership of the business hub, incubator, or business accelerator.

4. CONCLUSIONS

In general, the three variables studied were able to explain well to startup performance, so it is worth further investigation, especially considering that research in the context of startup is still not much done.

The research has several limitations. The first is a small sample size. To overcome this problem, the cooperation with various business hubs, incubators or business accelerators, especially those owned by universities. The second is the characteristics of startups studied, most of them are startups that have never received external funding so that the scale is still small. Therefore, it is suspected that their business intelligence & analytics activities are still not effective. Future studies need to consider researching largesized startups, for example startups that have received at least a title of centaur (have received funding of more than 500 million USD). Third, the model tested is the same model from reference [2] research. For further research, it can add several other variables such as absorption capacity, entrepreneurial orientation to organizational culture.

ACKNOWLEDGMENT

We would like to express our gratitude to STIE Inaba, Kolaborasi Business Incubator, and all startup participants who have facilitated the research to its completion.

REFERENCES

- [1] Hoffman, and C. E. Bamford, Strategic Management and Business Policy: Globalization, Innovation and Sustainability, 15th Edition, 15th ed. Pearson Education Limited, 2017.
- [2] N. Caseiro and A. Coelho, "The influence of business intelligence capacity, network learning and innovativeness on startups performance," *J. Innov. Knowl.*, vol. 4, no. 3, pp. 139–145, 2019, doi: 10.1016/j.jik.2018.03.009.
- [3] M. Hoppe, S. Hamrefors, and K. S. Soilen, "Competitive intelligence: competing, consuming and collaborating in a flat world," *Compet. Intell. Competing, Consum. Collab. a Flat World - Proc. Third Eur. Compet. Intell. Symp.*, 2009.
- [4] C. Villar, J. Alegre, and J. Pla-Barber, "Exploring the role of knowledge management practices on exports: A dynamic capabilities view," *Int. Bus. Rev.*, vol. 23, no. 1, pp. 38–44, 2014, doi: 10.1016/j.ibusrev.2013.08.008.
- [5] A. Colombelli, J. Krafft, and F. Quatraro, "Properties of knowledge base and firm survival: Evidence from a sample of French manufacturing firms," *Technol. Forecast. Soc. Change*, vol. 80, no. 8, pp. 1469–1483, 2013, doi: 10.1016/j.techfore.2013.03.003.
- [6] J. Weerawardena, G. S. Mort, S. Salunke, G. Knight, and P. W. Liesch, "The role of the market sub-system and the socio-technical sub-system in innovation and firm performance: a dynamic capabilities approach," *J. Acad. Mark. Sci.*, vol. 43, no. 2, pp. 221–239, 2014, doi: 10.1007/s11747-014-0382-9.
- [7] L. Vnoučková, "Criteria of innovativeness and creativity in start-ups and innovative entrepreneurship," *Qual. Innov. Prosper.*, vol. 22, no. 1, pp. 27–43, 2018, doi: 10.12776/QIP.V22I1.1040.
- [8] R. Calantone, R. Garcia, and C. Dröge, "The effects of environmental turbulence on new product development strategy planning," *J. Prod. Innov. Manag.*, vol. 20, no. 2, pp. 90–103, 2003, doi: 10.1111/1540-5885.2002003.
- [9] Z. Wang and N. Wang, "Knowledge sharing, innovation and firm performance," *Expert Syst. Appl.*, vol. 39, no. 10, pp. 8899–8908, 2012, doi: 10.1016/j.eswa.2012.02.017.
- [10] C. H. Wee and M. L. Leow, "Competitive business intelligence in singapore," *J. Strateg. Mark.*, vol. 2, no. 2, pp. 112–139, 1994, doi: 10.1080/09652549400000006.
- [11] CB Insight, "The most well-funded tech startups in asia and the pacific," CB Insight, 2020..
- [12] P. Wanda and S. Stian, "The secret of my success: an exploratory study of business intelligence management in the norwegian industry," *Procedia Comput. Sci.*, vol. 64, no. 1877, pp. 240–247, 2015, doi: 10.1016/j.procs.2015.08.486.
- [13] F. R. David and F. R. David, *Strategic management: a competitive advantage approach, concepts and cases*, 16th ed. Boston, MA: Pearson Education Limited, 2017.
- [14] P. Baltzan, *Business driven technology*, 8th editio., vol. 7, no. 1. New York: McGraw-Hill Education, 2020.
- [15] F. N. Al-Shubiri, "Measuring the imapct of business intellegence on performance: an empirical study," *Polish J. Manag. Stud.*, vol. 6, pp. 162–173, 2012.
- [16] P. T. Adidam, M. Banerjee, and P. Shukla, "Competitive intelligence and firm's performance in emerging markets: an exploratory study in india," *J. Bus. Ind. Mark.*, vol. 27, no. 3, pp. 242–254, 2012, doi: 10.1108/08858621211207252.
- [17] K. Gudfinnsson, M. Strand, and M. Berndtsson, "Analyzing business intelligence maturity," *J. Decis. Syst.*, vol. 24, no. 1, pp. 37–54, 2015, doi: 10.1080/12460125.2015.994287.
- [18] P. L. Dishman and J. L. Calof, "Competitive intelligence: a multiphasic precedent to marketing strategy," *Eur. J. Mark.*, vol. 42, no. 7–8, pp. 766–785, 2008, doi: 10.1108/03090560810877141.
- [19] A. Shollo and K. Kautz, "Towards an understanding of business intelligence recommended citation towards an understanding of business intelligence," *Assoc. Inf. Syst.*, vol. 86, p. 16, 2010.
- [20] S. Wright and J. L. Calof, "The quest for competitive, business and marketing intelligence: A country comparison of current practices," *Eur. J. Mark.*, vol. 40, no. 5–6, pp. 453–465, 2006, doi: 10.1108/03090560610657787.
- [21] K. Božič and V. Dimovski, "Business intelligence and analytics for value creation: the role of absorptive capacity," *Int. J. Inf. Manage.*, vol. 46, no. February 2018, pp. 93–103, 2019, doi: 10.1016/j.ijinfomgt.2018.11.020.
- [22] M. Hannula and V. Pirttimaki, "Business intelligence empirical study on the top 50 Finnish companies," 2003.
- [23] R. Pellissier and T. E. Nenzhelele, "Towards a universal definition of competitive intelligence,"

- SA J. Inf. Manag., vol. 15, no. 2, pp. 1–7, 2013, doi: 10.4102/sajim.v15i2.559.
- [24] Y. W. Chang, P. Y. Hsu, and Z. Y. Wu, “Exploring managers’ intention to use business intelligence: The role of motivations,” Behav. Inf. Technol., vol. 34, no. 3, pp. 273–285, 2015, doi: 10.1080/0144929X.2014.968208.
- [25] S. Negash and P. Gray, “Business intelligence handbook on decision support system 2,” in Handbook on Decision Support System 2, Springer Berlin Heidelberg, 2008, pp. 72–80.
- [26] R. Agarwal and V. Dhar, “Big data, data science, and analytics: The opportunity and challenge for IS research,” Inf. Syst. Res., vol. 25, no. 3, pp. 443–448, 2014, doi: 10.1287/isre.2014.0546.
- [27] K. Božič and V. Dimovski, “Business intelligence and analytics use, innovation ambidexterity, and firm performance: a dynamic capabilities perspective,” J. Strateg. Inf. Syst., vol. 28, no. 4, p. 101578, 2019, doi: 10.1016/j.jsis.2019.101578.
- [28] G. T. Lumpkin and G. G. Dess, “Clarifying the entrepreneurial orientation construct and linking it to performance,” Acad. Manag. Rev., vol. 21, no. 1, pp. 135–172, 1996, doi: 10.5465/AMR.1996.9602161568.
- [29] P. Shan, M. Song, and X. Ju, “Entrepreneurial orientation and performance: is innovation speed a missing link?,” J. Bus. Res., vol. 69, no. 2, pp. 683–690, 2016, doi: 10.1016/j.jbusres.2015.08.032.
- [30] C. W. L. Hill, M. A. Schilling, and G. R. Jones, *Strategic management: an integrated approach, theory & cases*, 12th ed. Boston, MA: Cengage Learning, 2017.
- [31] G. Gunday, G. Ulusoy, K. Kilic, and L. Alpkan, “Effects of innovation types on firm performance,” Int. J. Prod. Econ., vol. 133, no. 2, pp. 662–676, 2011, doi: 10.1016/j.ijpe.2011.05.014.
- [32] R. J. Calantone, C. S. Tamer, and Z. Yushan, “Learning orientation, firm innovation capability, and firm performance,” Ind. Mark. Manag., vol. 31, p. 515 citation_lastpage=524, 2004.
- [33] C. L. Wang and P. K. Ahmed, “The development and validation of the organisational innovativeness construct using confirmatory factor analysis,” Eur. J. Innov. Manag., vol. 7, no. 4, pp. 303–313, 2004, doi: 10.1108/14601060410565056.
- [34] G. Cepeda-Carrion, J. G. Cegarra-Navarro, and D. Jimenez-Jimenez, “The effect of absorptive capacity on innovativeness: Context and information systems capability as catalysts,” Br. J. Manag., vol. 23, no. 1, pp. 110–129, 2012, doi: 10.1111/j.1467-8551.2010.00725.x.
- [35] D. I. Prajogo, “The strategic fit between innovation strategies and business environment in delivering business performance,” Int. J. Prod. Econ., vol. 171, pp. 241–249, 2016, doi: 10.1016/j.ijpe.2015.07.037.
- [36] J. Wiklund and D. Shepherd, “Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses,” Strateg. Manag. J., vol. 24, no. 13, pp. 1307–1314, 2003, doi: 10.1002/smj.360.
- [37] O. Furrer, *Corporate level strategy: theory and applications*, 2nd ed. New York: Routledge, 2016.
- [38] C. Lee, K. Lee, and J. M. Pennings, “Internal capabilities, external networks, and performance: A study on technology-based ventures,” Strateg. Manag. J., vol. 22, no. 6–7, pp. 615–640, 2001, doi: 10.1002/smj.181.
- [39] M. A. Hitt, R. D. Ireland, S. M. Camp, and D. L. Sexton, “Strategic entrepreneurship: entrepreneurial strategies for wealth creation,” Strateg. Manag. J., vol. 22, no. 6–7, pp. 479–491, 2001, doi: 10.1002/smj.196.
- [40] S. Birley and P. Westhead, “Growth and performance contrasts between ‘types’ of small firms,” Strateg. Manag. J., vol. 11, no. 7, pp. 535–557, 1990, doi: 10.1002/smj.4250110705.
- [41] S. Gerschewski and S. S. Xiao, “Beyond financial indicators: AN assessment of the measurement of performance for international new ventures,” Int. Bus. Rev., vol. 24, no. 4, pp. 615–629, 2015, doi: 10.1016/j.ibusrev.2014.11.003.
- [42] N. Caseiro and A. Coelho, “Business intelligence and competitiveness: the mediating role of entrepreneurial orientation,” Compet. Rev., vol. 28, no. 2, pp. 213–226, 2018, doi: 10.1108/CR-09-2016-0054.