A Structural Relationship Between Environmental Uncertainty, Dynamic Capability, and Business Performance in a Smart Supply Chain Environment

Yongmuk Kim and Jongwoo Park

Abstract  E-commerce, based in the 4th industrial revolution to respond to environmental changes such as rapid technical development, increasing global competition, and diverse customer needs, is accelerating while uncertainty in the business environment grows more severe. In order to effectively respond to this uncertain business environment, individual companies and parts of supply chains need flexibility, and this need for dynamic flexibility is growing as uncertainty increases. In this study, we tested our hypothesis using structural equation model analysis to verify the structural relationship between dynamic capability and business performance in the smart supply chain environment of Korean small and medium manufacturers. We confirmed through this that dynamic capability and environmental uncertainty in a smart supply chain environment have a partially significant effect on business performance and that manufacturers must strive to implement direct, systematic policies and improve dynamic capability to respond to an uncertain business environment.

Keywords  Smart supply chain · Dynamic capability · Environmental uncertainty · Business performance

1 Introduction

As industrial activity is paralyzed due to recent rapid, dynamic changes in the corporate environment, protectionism, epidemic status, etc., we have been facing crisis not only in our daily lives but worldwide. In particular, untact, i.e. contactless, technology is being promoted throughout society due to COVID-19. E-commerce based on the 4th industrial revolution is accelerating to respond to these changes, and uncertainty in the business environment is growing. Studies proposing a clear definition of the 4th
industrial revolution in e-commerce have been few, but the 4th industrial revolution features a high level of connectivity and superintelligence, meaning that everything is connected by fusing digital devices, humanity, and physical environments to evolve into an intellectualized society [1].

Despite this technical development, businesses’ supply chain structure has comprised various participants from raw material producers to component producers, finished item producers, wholesalers and retailers, and transport companies throughout the process of manufacturing and delivering each product to the customer. Various issues such as uncertainty in predicting demand, understock, overstock, and logistics and transport delays may interfere with the operation of the supply chain and cause uncertainty and complexity when its participants are not perfectly matched [2–4]. The concept of smart supply chains has been proposed to reduce variations in supply and demand occurring due to supply chain complexity and uncertainty [5]. Smart supply chains attach various sensors and RFID tags to devices and products used in product manufacture and transport so relevant data can be collected and analyzed to operate and make decisions based on meaningful data [5, 6]. It is important for the technical capabilities of these smart supply chains to be able to respond efficiently to insufficient resources. They can increase efficiency using smart technology, but only if the necessary internal core competences for decision-making and for capabilities to respond to changes in the internal/external business environment are in place first. Therefore, leading and participating companies in smart supply chains must have dynamic capability in order to react flexibly to environmental changes and achieve good performance [7].

Previous research on smart supply chains has focused on the use of digitalized supply chains and studied, for example, the effects of information technology competence on supply chains; the effect of 4th industrial revolution technology on logistics performance; the effect of IoT technology on supply chains; the effect of 4th industrial revolution technology on supply chain performance; tracking logistics objects for smart SCM; basic factors in smart supply chain composition; research on smart SCM models using RFID; research on smart SCM models based on synchronization of logistics information; and key technologies and supply chain management in the 4th industrial revolution [5, 7–13]. Empirical research to analyze structural relationships between dynamic capability and business performance in a smart supply chain environment is therefore lacking, and studies in this field are needed.

The purpose of this study is therefore to empirically analyze the effects of environmental uncertainty and dynamic capability on business performance in a smart supply chain environment. Through this study uncertain business environments and proposes goals to achieve ongoing competitive advantages by confirming structural relationships connecting the acquisition of dynamic capability to business performance.
2 Theoretical Background and Hypotheses

2.1 Smart Supply Chains

The huge wave of the 4th industrial revolution amplifying uncertainty as well as changes in technology and markets has profound effects on companies of all sizes [14]. As technology develops, intelligent supply chain management technology is being used to strengthen competitiveness and ensure corporate productivity by improving logistics information [8]. Smart supply chains are systems that fuse IoT and cyber-physical systems with a flow of data and products with various sensors or RFID tags attached to, for example, devices or products to solve problems of dynamic complexity when operating the chains. Large volumes of information previously unavailable in supply chains are provided throughout the entire process so the operator can use them to operate and make decisions. This reduces inefficiency and enables flexible responses to business environments to achieve results [5]. Technological development is accelerating changes to smart supply chains in order to respond to uncertainty. If changes in large volumes of data generated between traders within the smart supply chain are collected in real-time and used effectively, they can alleviate various issues such as supply–demand mismatch, overstock, understock, and transport delays [5].

2.2 Dynamic Capabilities

Dynamic capabilities consist of information and knowledge acquired or learned to control, integrate, or rearrange resources in order to achieve competitive advantages while rapidly responding to a quickly changing business environment from an extensive viewpoint of core competences, the foundation of resource-based theory. They can be called systematic or organizational capabilities [15]. Dynamic capabilities propose grounds for the need to strengthen and maintain capabilities and ensure competitive advantages in very uncertain business environments while strengthening the dynamics of needed internal capabilities [16]. The concept of dynamic capability varies between scholars with a range of opinions regarding its constituents [17–21].

Exploring market opportunities is an essential element of sustainable corporate growth, and if a company can locate an opening more quickly than its competitors, this will be a good driver for its profit and growth [22]. The act of detecting market environments and collecting data while pursuing growth is itself the process of exploring opportunities [23]. Capability in exploring opportunities is a company’s action to detect opportunities and risks in the changing market environment and appears as a process of monitoring investment and technological changes to establish response strategies and gain market information based on those market changes as well as exchanging information about new opportunities [24]. From a smart supply chain perspective, the disruptive information technology of the 4th industrial revolution is
created as a management system connected to the supply chain, and capability with 
this smart IT affects the dynamic capability to be able to detect, explore, and seize 
business opportunities and risk elements [16]. Therefore, in order for a company to 
continue to thrive, it is important to constantly explore business opportunities, and 
these capabilities may be accumulated through a focus on the process of pursuing 
opportunities itself [25].

The construction and acquisition of resources and capabilities to respond to the 
rapidly changing market environment and maintain ongoing competitive advantages 
is an important factor for companies. Penrose [26] divided resources into physical 
and human resources, and Wernerfelt [27] defined tangible and intangible assets 
belonging semi-permanently to companies. The construction and acquisition of 
resources and capabilities to respond to the rapidly changing market environment and 
maintain ongoing competitive advantages is an important factor for companies. The 
acquisition of external resources is an especially crucial factor for small and medium 
businesses due to their relatively insufficient resources and capabilities [22]. Further-
more, acquisition of external resources and their application to the changing business 
environment plays the role of leverage for the sake of a company’s survival, enabling 
it to achieve better performance than its competitors. Resource acquisition capability, 
the ability to acquire new information and knowledge from outside the company due 
to insufficient resources in this changing environment, is a key factor in a company’s 
dynamic capability [28].

For the sake of a company’s survival and sustainable growth in a quickly changing 
market environment, reallocation of that company’s resources is inevitable [22]. 
This is because companies’ resources, capabilities, and structure must be integrated 
or reconfigured from mature business or declining fields of business to new busi-
ness opportunities [24]. In other words, resource reconfiguration capabilities are a 
company’s skill in integrating and reallocating previous and new resources to convert 
into new resources [19, 24]. This conversion and adjustment of resources is necessary 
for a company to survive and maintain its competitive advantages in a changing busi-
ness environment. A company’s skill in integrating and combining resources plays 
a key role in product innovation. The process of product innovation demands active 
combination of tangible and intangible assets by businesses and managers, and the 
skill to combine these is at the heart of dynamic capability regardless of a company’s 
size [29]. However, since small and medium companies are weaker than large ones 
in terms of technology, capital, manpower, business, etc. [30], they may be limited 
in their ability to transform according to smart supply chain environment changes 
right away [31]. However, resource reconfiguration, a part of dynamic capability, 
is an important factor in creating new technology through readjusting and reallo-
cating previously and newly acquired resources in order to respond to a changing 
environment, even if such resources are limited [32].
2.3 Dynamic Capabilities and Business Performance

Dynamic capabilities are playing a larger role in business performance while levels of uncertainty and competition increase in the business environment recently. Organizations must acquire dynamic capabilities for their own survival and performance improvement in a rapidly changing business environment. Dynamic capabilities are skills enabling a company to readjust its resources to achieve new competitive advantages, and such capabilities are strategic rather than temporary problem-solving abilities that show sustainability over time [18]. Companies must acquire enough organizational capital to create excellent results while responding to environmental changes and can only achieve sustained competitive advantages if they have the dynamic capability to use this capital according to their vision and mission. Furthermore, dynamic capabilities are controlled by past activities, current position, and future processes which are recreated in a new market environment [22]. Makadok [33] stated that the capability to explore opportunities, resource acquisition, and the capability to reconfigure resources, all elements of dynamic capability, show in a company’s profits. Zahra et al. [34] proposed that dynamic capabilities indirectly affect business performance. Kim et al. [22] stated that elements of dynamic capability have significant effects on a company’s financial and non-financial business performance. It has additionally been proposed that a company’s dynamic capabilities have a positive effect on its financial or non-financial performance and are an element in its competitive advantages [35, 36]. This study therefore has the following hypotheses based on previous research.

H1. Dynamic capabilities have a positive effect on financial performance.
H2. Dynamic capabilities have a positive effect on non-financial performance.

2.4 Environmental Uncertainty

The business environment is changing at such a rapid speed that it is difficult for companies to predict by combining all elements related to direct/indirect business, and the number of factors businesses must take into consideration is gradually increasing as well [37]. Amidst this rapid change, environmental uncertainty from the point of view of companies and the supply chain is an inherent condition in interactions between companies, and this means that while new products and technologies are frequently released among fierce competition and customer demand strongly fluctuates, government policies often change and the results of decisions are difficult to accurately predict [38]. Ganbold and Matsui [39] subdivided environmental uncertainty into supply uncertainty, demand uncertainty, and technical uncertainty in a study on integration of supply chain management. In general, it can be predicted that the more complex the environment and the more dynamic the awareness, the more companies will strive to actively set targets and reduce that uncertainty [40]. Hong and Cheong [41] proposed that the speed of environmental
change affects information sharing and cooperation, while Jo et al. [42] stated that improvement of business skills is an essential factor to achieve goals in an uncertain market environment and adapt to market changes. Furthermore, according to research by Ji and Pyun [43], individual companies with resource limitations aim to actively cope with environmental uncertainty to reduce it while accelerating product release and decision-making and improving their responsivity to market changes in order to use this environmental uncertainty as an opportunity. Lee [44] found that the greater the uncertainty, the greater the logistics performance in a study of differences in logistics performance according to environmental uncertainty. Therefore, the environmental uncertainty perceived by members of the supply chain can be expected to affect dynamic capability and business performance, and so we propose the following hypotheses.

H3. Environmental uncertainty has a regulative affect in the relationship between dynamic capability and financial performance.
H4. Environmental uncertainty has a regulative affect in the relationship between dynamic capability and non-financial performance.

3 Research Method

3.1 Data Collection

In A total of 290 surveys of employees of small and medium manufacturers understanding supply chains were distributed by mail from January to February of 2020 in order to analyze the structural relationship between dynamic capability and business performance in a smart supply chain environment. Of these, 219 were collected, and 8 were excluded due to unfaithful responses, leaving 211.

The manufacturers who were subjects of this study could be broadly classified into suppliers and purchasers, with 83 suppliers (39.3%) and 128 purchasers (60.7%). There were 159 companies less than 20 years old (75.4%) and 52 more than 20 years old (24.6%). In terms of number of employees, 205 companies had less than 100 (97.2%), while 6 (0.8%) had more than 100. There were 149 companies (70.6%) with less than 10 billion won in sales and 62 (29.4%) with more than 10 billion won in sales. Regarding partners, 180 companies (85.3%) had less than 50 partners, while 31 companies (14.7%) had more than 50 partners.

3.2 Measurement

The variables of dynamic capability and business performance used in this study were derived from previous research and measured on a 5-point Likert scale. Items
measured for each variable were tested for validity and reliability in preceding research, and these were adjusted and used for this study (Table 1).

4 Empirical Analysis

4.1 Testing the Measurement Model

To test this study’s hypotheses, we had to test the fitness, reliability, and validity of the measurement model, and we used confirmatory factor analysis for this. We judged fitness of the measurement model by using absolute fit index, incremental fit index, and parsimonious fit index. The results of confirmatory factor analysis of the measurement model showed that $\chi^2 = 1709.131 (P = 0.000)$ and $\chi^2/df = 2.735$, below the recommended level of 3, and RMR = 0.054, below the recommended figure of 0.08. Furthermore, PGFI = 0.607, above the recommended value of 0.6; CFI = 0.849 and TLI = 0.830, slightly lower than the recommended figure of 0.9 but still satisfactory; and PNFI = 0.697 and PCFI = 0.755, above the recommended level of 0.6. The measurement model proposed in this study was thus deemed to be fit. The reliability and validity of the measurement tool were thereby proven as the measurement model was deemed fit. The convergent validity of the measurement tool must have a standardized regression coefficient greater than 0.5 and ideally greater than 0.7. Construct reliability (CR) must be above 0.7 and average variance extracted (AVE) must be above 0.5 to be considered fit. Furthermore, for discriminant validity, the latent factor’s AVE must exceed the squared value of the correlation coefficient between constructs ($\varnothing^2$).

4.2 Testing the Structural Model

With the fitness of this study’s measurement model and reliability and validity of this model confirmed, we implemented analysis of the structural model to clarify whether the theoretical relationships of the research model were supported by the data. The results of testing the fitness of the structural model showed that $\chi^2 = 1703.81 (P = 0.000)$ and $\chi^2/df = 2.734$, below the recommended level of 3, and RMR = 0.056, below the recommended figure of 0.08. Furthermore, PGFI = 0.612, above the recommended value of 0.6, and CFI = 0.847 and TLI = 0.830, slightly below the recommended level of 0.9 but still satisfactory. PNFI = 0.703 and PCFI = 0.763, above the recommended value of 0.6, meaning that the proposed structural model is fit.

With the structural model used in this study deemed fit, we tested our hypotheses by measuring path coefficients between the research variables. Results of testing the hypotheses showed that in the relationship between dynamic capability and financial
| Variable                  | Item measured                                                                 | References                  |
|--------------------------|-------------------------------------------------------------------------------|-----------------------------|
| Dynamic capability       | Opportunity exploration capability                                            | [17, 18, 45, 24, 46, 22]   |
|                          | Benchmarking excellence in the same industry                                  |                             |
|                          | Occasional checking and analysis of market changes                           |                             |
|                          | Seeking ideas for new product development                                     |                             |
|                          | Ongoing collection of competitor information                                  |                             |
|                          | Exploring, collecting, and analyzing market opportunities                     |                             |
| Resource acquisition     | Fostering experts for new business                                           |                             |
| capability               | Acquiring external knowledge for new product development                      |                             |
|                          | Building partnerships with other companies to develop capabilities            |                             |
|                          | Systematizing internal knowledge from employee experiences                    |                             |
|                          | Acquiring resources for new product development                              |                             |
| Resource reconfiguration | Process reconfiguration to introduce new technology and knowledge            |                             |
| capability               | Integration and adjusting of management teams to respond to environmental changes |                             |
|                          | Resource reallocation to suit new environments                                |                             |
|                          | Changing technical facility processes to respond to environmental changes    |                             |
|                          | Reconfiguration of resources needed to develop new products                   |                             |
| Business performance     | Financial performance                                                         | [22, 47, 48]                |
|                          | Increased sales                                                              |                             |
|                          | Increased operating profit                                                    |                             |
|                          | Improved cash flow                                                           |                             |
|                          | Increased market share                                                       |                             |
| Non-financial            | Improving participants’ capabilities and technical level                      |                             |
| performance              | Improving customer satisfaction                                               |                             |
|                          | Improving the company and product image                                       |                             |
|                          | Improving employee satisfaction                                               |                             |
| Environmental uncertainty| Demand uncertainty                                                            | [2, 4, 49]                  |
|                          | Supply uncertainty                                                            |                             |
|                          | Competitor uncertainty                                                        |                             |
|                          | Technical uncertainty                                                         |                             |
performance, the coefficient value of opportunity exploration capabilities toward financial performance was ($\beta$) = 0.349 (C.R. = 3.016, $p = 0.003$), the coefficient value of resource acquisition capability toward financial performance was ($\beta$) = 0.064 (C.R. = 0.454, $p = 0.650$), and the coefficient value of resource reconfiguration capability toward financial performance was ($\beta$) = 0.223 (C.R. = 1.940, $p = 0.052$), and we therefore selected Hypothesis H1-1 and rejected Hypotheses H1-2 and H1-3.

Moreover, in the relationship between dynamic capability and non-financial performance, the coefficient value of opportunity exploration capability toward non-financial performance was ($\beta$) = 0.329 (C.R. = 3.535, $p = 0.000$), the coefficient value of resource acquisition capability toward non-financial performance was ($\beta$) = 0.265 (C.R. = 2.303, $p = 0.021$), and the coefficient value of resource reconfiguration capability toward non-financial performance was ($\beta$) = 0.276 (C.R. = 2.966, $p = 0.003$), and we therefore selected all three Hypotheses H2-1, H2-2, and H2-3.

### 4.3 Moderating Effects of Environmental Uncertainty

Results of analyzing the moderating effects of environmental uncertainty in the relationship between dynamic capability and business performance showed a correlation between opportunity exploration capability and non-financial performance ($t = -2.026$, $p = 0.044$) and a correlation between resource reconfiguration capability and non-financial performance ($t = -2.850$, $p = 0.005$), suggesting that environmental uncertainty has a significant regulating effect.

### 5 Conclusions

For this study, we reviewed the role of variables through literature research and empirically tested their influence relationships to determine the effect of a company’s dynamic capabilities on its business performance so small and medium manufacturers can respond to rapidly changing business environments within a smart supply chain.

Setting hypotheses regarding the interaction between dynamic capability and business performance showed that dynamic capabilities had a partially significant effect on business performance. In more detail, opportunity exploration capabilities affected both financial and non-financial performance, and resource acquisition capabilities and resource reconfiguration capabilities only affected non-financial performance. These results support the conclusions of Eisenhardt and Martin [18], Kim and Huh [36], and Kim et al. [22] and confirm that small and medium companies’ dynamic capabilities are positively correlated with their business performance. As small and medium companies are relatively lacking in resources and struggle to sustain competitive advantages in a rapidly changing, dynamic environment, they need dynamic capabilities to respond to these constantly changing situations. However, resource acquisition capabilities and resource reconfiguration capabilities were not found to
have a significant effect on financial performance. We can infer from this that since financial performance is a short-term, direct measure of a company’s past business activities, there is little direct, short-term correlation between resource acquisition capabilities and resource reconfiguration capabilities which appropriately reallocate to a company’s business capabilities and act as leverage.

Moreover, the results of testing the regulating effects of environmental uncertainty in the relationship between dynamic capabilities and business performance showed that environmental uncertainty does have a regulating effect only in the relationship between dynamic capability and non-financial performance. This shows that environmental uncertainty has a regulating effect in the more long-term results appearing in the relationship with non-financial performance rather than in the short-term results of financial performance, and this could imply a need to establish strategies early in order to improve long-term responsiveness to environmental uncertainty.

This study deviated from previous research which focused on the role of IT on supply chain performance and logistics performance in a smart supply chain environment for the sake of small and medium companies’ business performance to confirm dynamic capability factors that companies must improve to maintain competitive advantages in an uncertain business environment and to establish a structural relationship linking acquisition of dynamic capabilities to business performance.

For this study, we set our primary subjects as small and medium manufacturers to establish a structural relationship between dynamic capabilities and business performance in a smart supply chain environment. However, the business conditions of these companies may differ, and we did not measure or categorize them systematically according to their stage of smart supply chain construction but rather generalized them all. More meaningful studies are expected in the future if differences in awareness of dynamic capabilities is confirmed by classifying clear differences in the characteristics of different industries and the roles of suppliers and purchasers as we selected suppliers and purchasers in the supply chain environment based on their subjective responses.

References

1. Kim JH (2016) In the era of the 4th industrial revolution, seeking strategic responses to future social changes. R&D In 15:45–58
2. Kim SO, Youn SH (2008) A study on the effects of environment uncertainty and inter-firm collaboration practice on supply chain flexibility. Korean Assoc Indust Bus Administ 23(1):337–364
3. Lee GD (2013) An empirical study on the relationships among environmental uncertainty, management by objectives and organization satisfaction. Tax Account Res 22(1):179–202
4. Kim JY, Bang HY (2014) The effects of output sector uncertainty on dependence, commitment and strategic performance: a comparative analysis on korean and american manufacturers. Korea Assoc Int Commer Inf 16(1):163–183
5. Shin JC, Lim OK, Park YH, Song SH (2017) A study on determining priorities of basic factors for implementing smart supply chain. J Korean Soc Supply Chain Manage 17(1):1–12
6. Lifang W, Yue X, Alan J, Yen DC (2016) Smart supply chain management: a review and implications for future research. Int J Logist Manage 27(2):395–417
7. Moon TS, Kang SB (2014) An empirical study on the impact of it competence on supply chain performance through supply chain dynamic capabilities. Korean Manage Rev 43(1):245–272
8. Kim JG (2013) A study on the logistics information synchronization based smart SCM model. KIPS Trans Softw Data Eng:311–318
9. Lee KB, Baek DH, Kim DH (2016) A study on the effect of the IoT technology on SCM. J Inf Technol Serv 15(1):227–243
10. Lee CB, Noh JH, Kim JH (2017) A study on the perception of the impact of fourth industrial revolution on the performance of logistics management. Korea Logist Rev 27(5):1–12
11. Chung CC (2017) The fourth industrial revolution—an exploratory study on main technologies and supply chain management. Korea Logist Rev 27(6):193–209
12. Noh JH, Lee KN (2018) The effect of supply chain related 4th industrial revolution technology on BSC supply chain performance. Korea Logist Rev 28(5):53–64
13. Kwak KG, Hwang SY, Shin DJ, Park KW, Kim JJ, Park JM (2020) Study of logistics object tracking service for smart SCM. J Korean Inst Indus Eng 46(1):78–81
14. Kim HT, Kwon SJ (2019) Exploring the industrial structure and innovation policy for sustainable growth of machinery industry in South Korea. Sci Technol Policy Inst 2(1):107–131
15. Huh YH, Lee C (2012) Determinants of dynamic capability and its relationships with competitive advantage and performance in foreign markets. Int Bus J 23(1):33–73
16. Rhee YP (2020) The relationships between IT capability, dynamic capability and international performance in Korean SMEs. Int Bus Rev 24(1):107–120
17. Teece DJ, Pisano G, Shuen A (1997) Dynamic capabilities and strategic management. Strateg Manage J 18(7):509–533
18. Eisenhardt KM, Martin JA (2000) Dynamic capabilities: what are they? Strateg Manage J 21(10):1105–1121
19. Bowman C, Ambrosini V (2003) How the resource-based and the dynamic capability views of the firm inform corporate-level strategy. Br J Manage 14(4):289–303
20. Wang C, Ahmed PK (2007) Dynamic capabilities: a review and research agenda. Int J Manage Rev 9(1):31–51
21. Denford JS (2013) Building knowledge: developing a knowledge-based dynamic capabilities typology. J Knowl Manage 17(2):175–194
22. Kim JK, Yang HC, Ahn TD (2017) The moderating effect of manufacturing process type on the relationship of dynamic capabilities and business performance of SMEs. Asia-Pacific J Multimedia Serv Converg Art Human Sociol 7(8):141–151
23. Helfat C, Finkelstein S, Mitchell W, Peteraf M, Singh H, Teece D, Winter S (2007) Dynamic capabilities: understanding strategic change in organizations, pp 1–18
24. Teece DJ (2007) Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. Strateg Manage J 28(13):1319–1350
25. Ambrosini V, Bowman C (2009) What are dynamic capabilities and are they a useful construct in strategic management? Int J Manage Rev 11(1):29–49
26. Penrose ET (1959) The theory of the growth of the firm. Oxford
27. Wernerfelt B (1984) A resource-based view of the firm. Strateg Manage J 5(2):171–180
28. Verona G, Ravasi D (2003) Unbundling dynamic capabilities: an exploratory study of continuous product innovation. Indus Corp Change 12(3):577–606
29. Augier M, Teece DJ (2009) Dynamic capabilities and the role of managers in business strategy and economic performance. Organ Sci 20(2):410–421
30. Kim YY, Park YS (2017) Fourth industrial revolution and SME supporting policy 20(2):387–405
31. Park CK, Kim CB (2019) Effect of agility capabilities for smart manufacturing and smart SCM implication on enterprise and supply chain performance in the 4th industrial revolution. J Small Bus Innov 22(4):23–67
32. Morgan NA (2012) Marketing and business performance. J Acad Mark Sci 40(1):102–119
33. Makadok R (2001) Toward a synthesis of the resource-based and dynamic capability views of rent creation. Strateg Manage J 22:387–401
34. Zahra SA, Sapienza HJ, Davidsdson P (2006) Entrepreneurship and dynamic capabilities: a review, model and research agenda. J Manage Stud 43(4):917–955
35. Hwang KY, Sung EH (2015) The relationships between dynamic capabilities, innovation performance and performance of export venture firms. J Int Trade Commer 11:401–420
36. Kim GT, Huh MG (2016) Dynamic capabilities and competitive advantages: the moderating effect of environmental dynamism. J Strat Manage 19(3):81–103
37. Huh SJ, Lee JY, Hyeon JW, Choi YS (2018) Business environment uncertainty and real earnings management. Korean Corpor Manage Rev 25(6):77–101
38. Miller D (1988) Relating Porter’s business strategies to environment and structure: analysis ans performance implications. Acad Manage J 31(2):280–308
39. Ganbold O, Matsu Y (2017) Impact of environmental uncertainty on supply chain integration: empirical evidence. J Jpns Oper Manage Strat 7(1):37–56
40. Park SM, Park CW (2018) A study on the effect of multi-dimensionality of environmental uncertainty on smart SCM factors and corporate management performance. Korea J Logist 26(2):105–126
41. Hong KS, Cheong KW (2004) The impact of environmental clockspeed, information sharing, and collaboration on supply chain performance. Korean Small Bus Rev 26(2):77–100
42. Jo YG, Lee HG, Ha KT (2007) The relationship among the utilization of IT based on realizing RTE, agility capabilities and company performance. Entrue J Inf Technol 6(2):113–127
43. Ji SG, Pyun HS (2009) The relationship among environmental uncertainty, marketing agility, marketing performance. Korea J Bus Administ 22(2):1013–1035
44. Lee CS (2012) The moderating effects of logistics management system sophistication and strategy on the relationship of environmental uncertainty and logistics performance. Korea Logist Rev 22(1):183–209
45. Zollo M, Winter S (2002) Deliberate learning and the evolution of dynamic capabilities. Organ Sci 13:339–351
46. Chun JJ, Lee BH (2016) The effect of dynamic capabilities on international performance of Korean exporting SMEs: the moderating role of environmental dynamism and firm type. Int Bus Rev 20(1):45–74
47. Karplan RS, Norton DP (1966) Using the balanced scorecard as a strategic management system. Harvard Bus Rev:75–85
48. Lee JD, Lee YB, Bae YS (2014) The effects of SMEs’ core competency and competitive strategy on their business performance. J Korean Entrepreneurs Soc 9(3):154–183
49. Walker G, Weber D (1984) A transaction cost approach to make-or-buy decision. Adm Sci Q 29(3):374–391