EasyChair Preprint

№ 2640

On Pursuing Competitive Strategy: The Effect of Marketing Intelligence Capability

Wilson Weng

February 12, 2020

On Pursuing Competitive Strategy:

The Effect of Marketing Intelligence Capability

Wilson W. H. Weng

National Chengchi University, Taiwan
wilsonw.weng@msa.hinet.net

Abstract

Marketing plays a key role in successful business operations. Marketing intelligence is a critical component for overall marketing activities of a firm, and it is even more crucial in the era of electronic commerce and global transactions. However, there have been relatively few studies on the strategic effect of marketing intelligence for firms in the literature. Referring to the organizational capability perspective, this study constructed a linkage of marketing intelligence capability and business strategy formation. An empirical survey was performed and an analysis of the data was conducted to test the hypotheses. The results confirmed the role of marketing intelligence capability in the link towards business strategy formation. Discussions with managerial implications are then elaborated.

Keywords: marketing intelligence, business strategy, organizational capability, differentiation, cost leadership

1. Introduction

Organizational capabilities play a pivotal role in the business strategy which a firm pursues. The essence of strategy formulation is to design a strategy that makes the most effective use of these core capabilities [1]. Furthermore, designing strategy around the most critical capabilities implies that the firm focuses its strategic scope to those activities where it possesses a clear competitive advantage [2].

A firm is a value chain assembled with various value activities [3]. These value activities include primary functional operations such as productions, marketing, sales and services, as well as supportive functional operations such as human resource management, research and development (R&D), and information systems. Among these functional operations, marketing function plays a key role in shaping overall business strategy of a firm [4, 5]. Marketing is tightly related to many other functional operations of a firm, such as production, sales and customer service [6-11]. Furthermore, in a firm's marketing operations, marketing intelligence is the foundation of overall marketing activities, because marketing decisions rely on the capability of acquiring and interpreting accurate marketing intelligence [12].

Effective marketing requires adequate information for planning and allocating resources properly to different markets, products, territories, and marketing tools [13]. Marketing intelligence is the systematically collected and extracted information for making marketing decisions. Marketing intelligence is a critical component for overall marketing activities of a firm. Acquisition and effective use of marketing intelligence is vital in shaping the firm's sustainable competitive advantage [14, 15].

Marketing intelligence capability concerns a firm's ability to learn about customers, competitors, channel members and the broader market environment in which it operates [16, 17]. As a critical organizational capability, marketing intelligence capability plays a key role in a firm towards gaining competitive advantage.

However, thus far research on the relationship between marketing intelligence capability and business strategy is scant. Empirical studies on how marketing intelligence capability affects the formulation of business strategy are also rare in the literature. Therefore, the objective of this research is to investigate the linkage between marketing intelligence capability and business strategy formulation.

The paper begins with a review of the relevant literature about the relationships between marketing intelligence and business strategy. Then it proposes hypotheses which link these variables. Following that, the hypotheses are tested using a sample of Taiwanese companies with global operations. Finally, the findings are presented along with the managerial implications of the study and recommendations for future work.

2. Hypotheses

Marketing intelligence is about staying ahead of the competition by gathering information which could be converted to actionable intelligence and which can then be applied to both short and long term strategic planning [18, 19]. Marketing intelligence is considered as a strategic resource that enables a firm to strengthen its opportunity recognition, threat identification and achieve a positional advantage over its competitors [16]. Hence it is related to the firm's business strategy formation.

Business strategy formation is comprised of mission and goal clarity, situation analysis, comprehensiveness of alternative evaluation, and strategy formation process [20]. A business strategy concerns the competitive positioning, market segmentation and industry environment of a company [21]. To survive, grow and sustain, a firm needs to constantly monitor its internal and external status for possible changes. Thus the formulation and execution of a business strategy rely heavily on the collection, extraction, analyze, interpretation and prediction on internal and external status data of the company, in order to make accurate managerial decisions [22, 23]. Therefore, a firm's marketing intelligence capability is critical in facilitating its business strategy formation. Furthermore, business strategies of most companies are frequently a combination of their intended strategies and the emergent strategies [24]. Business leaders need to analyze the status information of emergence and to make strategy adjustment when appropriate [25]. For this purpose, marketing intelligence capability is also essential as the ability for the strategic decisions to be accurately updated and aligned with competition changes [26, 27].

From the strategic management perspective, cost leadership and differentiation are two important approaches to competitive advantage and basic choices of business strategy [21, 28]. Furthermore, researchers have argued that cost leadership and differentiation are not mutually exclusive, but rather are compatible approaches to dealing with external situations, and a combination of strategies could lead to success in various circumstances [29-31].

Cost leadership strategy requires organizational capabilities to achieve operational efficiency, including time efficiency, cost efficiency and flexibility. Marketing intelligence capability enables a firm to acquire and analyze the cost structures and distinctive features of products and services of peers in the marketplace. It helps the firm to determine which market segments are suitable for cost leadership, and which market segments are feasible for differentiation. Marketing intelligence about cost analytics of all levels needs to be collected and accurately analyzed for a firm to maintain a viable leading cost status.

Differentiation strategy requires organizational capabilities to achieve product or service uniqueness for higher customer premium. Products or services differentiation are realized through innovation or customization. Marketing intelligence about customer preferences and distinctive features are required for a firm to determine the need to differentiate its

products against the need to keep its cost structure under control in order to offer a distinctive product at a competitive price [20, 32].

Therefore, the following two hypotheses are proposed:

Ha. Marketing intelligence capability is positively associated with cost leadership strategy formation.

Hb. Marketing intelligence capability is positively associated with differentiation strategy formation.

3. Research Method

3.1 Survey Instrument

The survey instrument was developed using questions derived from the literature on information technology capabilities, marketing capabilities, and Porter's typology of competitive strategies discussed previously. We operationalized the study variables by using multi-item reflective measures on a 7-point scale [33].

A firm's marketing intelligence capability concerns its competency in intelligence generation, intelligence dissemination, and responsiveness [14, 34]. Marketing intelligence capability is operationalized as the accessibility and utilization of resources and activities within a firm to collect and analyze market information, and utilize it to develop effective marketing programs. The ability to effectively gather and disseminate customer and competitor information is critical for marketing intelligence capability [34, 35]. This four-item scale was adapted from Vorhies, et al. [36] and Trainor, et al. [12].

The construct of cost leadership strategy formation was measured using four items that reflect the extent to which a firm forms a cost-oriented strategy. The formation of cost leadership strategy aims at achieving low manufacturing and distribution costs [21, 35, 37]. The third item was the economic scale. A firm can usually lower cost through economies of scale or superior manufacturing processes [3, 21]. Finally, formation of cost leadership is often reflected in lower price of products or services [37, 38].

The construct of differentiation strategy formation was measured using four items that reflect the extent to which a firm forms a differentiation strategy. Differentiation implies being unique or distinct from competitors by providing superior functionality or customized feature within products or services to customers [21, 39]. Extending Porter's business strategy framework, Miller [40] discriminated differentiation strategy based on innovation from that based on intensive marketing [40, 41]. This distinction forms two items included in the construct.

All items for this study were assessed with a 7-point Likert scale ranging from "strongly disagree" to "strongly agree." Furthermore, firm size, IT department size and industry sector were used as control variables, as these variables have been noted in several studies to affect

deployment of information technologies [42, 43]. Table 1 presents the items used to measure each of the independent and dependent construct variables.

Table 1 Constructs and items used in the survey

Construct and item description (1 – strongly disagree; 7 – strongly agree)
MIC: Marketing intelligence capability
MIC1: My company is competent in collecting information about customers and competitors
MIC2: We are proficient in tracking customer needs and wants
MIC3: We are skillful in analyzing and disseminating marketing information
MIC4: We are competent in developing effective marketing programs
CLS: Cost leadership strategy formation
CLS1: We provide low cost products or services based on manufacturing efficiency
CLS2: Our products or services have lower distribution cost than our competitors
CLS3: We develop and deliver products or services with economy of scale
CLS4: Our products or services have lower prices than competitors in the market
DFS: Differentiation strategy formation
DFS1: We deliver products or services with superior functionality to our competitors
DFS2: We provide products or services with customized feature to our customers
DFS3: Our firm differentiates our products or services based on innovation
DFS4: Our firm differentiates our products or services based on intensive marketing
Control Variables (rescaled)
Industry: Industry sectors of firms. 1 for service firms and 0 for manufacturing firms.
Firm Size: Total number of employees.
IT Size: Total numbers of IT staffs.

3.2 Sample and Data Collection

A questionnaire designed in accordance with Table 1 above was implemented as the survey instrument. It was then pretested with 13 executives and managers. The pretesting focused on instrument clarity, question wording, and validity. Members of the testing sample were invited to comment on the questions and wording of the questionnaire. The comments of these respondents then provided a basis for revisions to the questionnaire to establish content validity.

Enterprises based in Taiwan were surveyed in order to test the hypotheses. A sample of 1,000 firms was randomly selected from the top 5,000 list of the largest companies in Taiwan published by a Taiwanese marketing research organization. Most of the companies in the list are public listed corporations with international operations.

The survey, which took three months to complete, was initially conducted by postal mail and e-mail, and then followed up with telephone calls and in-person visits. A total of 217 responses were received, of which 15 were unusable and eliminated. The remaining 202 responses were used in this study, for a response rate of 20.2%.

The mean differences between responding and non-responding firms were compared along firm attributes using t-tests and all statistics were non-significant. Furthermore, the responses received during the first two months were classified as early returns, and those received during the last months as late returns. The two groups were then compared for any significant difference in responses using the chi-square test of independence. No significant difference was found between the two groups, supporting that response bias is not an issue in this study [44]. Table 2 shows the profile of the final sample list.

Table 2 Profile of the final sampling firms

	Sample size	Percentage
Industry		
Manufacturing	92	45.5%
Services	110	54.5%
Total	202	100.0%
Firm size		
Under 100	50	24.8%
100-199	53	26.2%
200-499	40	19.8%
500 and above	59	29.2%
Total	202	100.0%
IT department size		
Under 5	67	33.2%
5-19	62	30.7%
20 and above	73	36.1%
Total	202	100.0%

4. Results

Our goal was to investigate the impact of marketing intelligence capability on business strategy formation. The empirical results were expected to demonstrate that a firm's formation of business strategy, such as cost leadership strategy and differentiation strategy, is influenced by marketing intelligence capability.

4.1 Reliability and Validity

The reliability of the survey instrument was tested by using Cronbach's alpha [45] to assess the internal consistency of the proposed constructs listed in Table 1. Cronbach's alpha tests the interrelationship among the items composing a construct to determine if the items measure a single construct. Nunnally and Bernstein [46] recommended a threshold alpha value of .7. Cicchetti, et al. [47] further suggested the following reliability guidelines for determining significance: $\alpha < .70$ (unacceptable), $.70 \leq \alpha < .80$ (fair), $.80 \leq \alpha < .90$ (good), and $\alpha > .90$ (excellent).

Content validity [48] refers to the extent to which the instrument measures what it is designed to measure. Most of our measures used in the study were adopted from relevant studies. Although basing the study on the established literature provided a considerable level of validity, the study's validity was further improved by pre-testing the instrument on a panel of experts comprising 13 business executives and managers.

Table 3 summarizes the descriptive statistics and results of the reliability and validity tests. The reliability of the instrument was examined using composite reliability estimates by employing Cronbach's α. All the coefficients exceeded Nunnally's recommended level (0.70) of internal consistency [46, 47]. In addition, factor analysis was performed to confirm the construct validity. The results supported the constructs of our research model. The discriminant validity was confirmed since items for each constructs loaded on to single factors with all loadings greater than 0.8. These results confirmed that each of the construct in our hypothesized model is unidimensional and factorially distinct, and that all items used to operationalize a construct is loaded onto a single factor.

Table 3 Descriptive statistics and reliability and validity test

Construct	Item	Mean	SD	Cronbach's alpha	Cronbach's alpha if item deleted	Factor loading on single factor
MIC	MIC1	4.755	1.022	0.920	0.922	0.854
	MIC2	4.787	.931		0.886	0.923
	MIC3	4.828	.931		0.901	0.890
	MIC4	4.764	.857		0.878	0.940

CLS	CLS1	4.329	.910	0.951	0.933	0.931
	CLS2	4.375	.863		0.937	0.941
	CLS3	3.988	.729		0.943	0.937
	CLS4	4.724	.990		0.930	0.946
DFS	DFS1	4.675	.962	0.891	0.837	0.911
	DFS2	4.616	1.106		0.859	0.872
	DFS3	4.616	1.039		0.870	0.848
	DFS4	4.787	.959		0.873	0.848

Table 4 summarizes the correlations among different factors. We also assessed discriminant validity on the basis of the construct correlation that Campbell and Fiske [49] proposed. The tests indicated acceptable results with respect to discriminant validity.

Table 4 Construct correlation

Construct	1	2	3	4	5	6
1. MIC	1					
2. CLS	0.532**	1				
3. DFS	0.580**	0.576**	1			
4. Industry	-0.062	0.080	0.046	1		
5. Firm Size	0.006	0.099	0.055	-0.100	1	
6. IT Size	0.068	0.148	0.138	-2.790**	0.402**	1

*p < 0.05, **p < 0.01

4.2 Tests of Hypotheses

To test our hypotheses, linear regression analysis was performed using SPSS version 21. We examined the degree to which our data met appropriate statistical assumptions in the case of linear regression analysis such as normality and linearity, and our data met the requisite assumptions.

Table 5 summarizes the test results regarding the parameter estimates and p-values of the hypotheses. We also included industry, firm size and IT department size as control variables in the analysis.

Table 5 Tests results of the hypotheses

Dependent variable	Explanatory variable		Control variable						
	MIC		Industry		Firm Size		IT Size		
	Estimate	P-value	Estimate	P-value	Estimate	P-value	Estimate	P-value	R^2
CLS	0.533	0.000***	0.156	0.012	0.058	0.365	0.131	0.050	0.321
DFS	0.579	0.000***	0.119	0.051	0.012	0.845	0.127	0.052	0.360

*p < 0.05, **p < 0.01, ***p < 0.001

The results in Table 5 supported our hypotheses. The direct effects of MIC on CLS and DFS are tested significant.

5. Discussion

5.1 Research Implications

This study investigated the impact of a firm's marketing intelligence capability on business strategy formation. By supporting the research hypotheses, this study could be directed toward helping managers and practitioners realize the links between organizational capabilities and business strategy formation.

First, the cultivation of organizational capabilities, in general, is expected to enhance an organization's business strategies and further elevate its competitive advantage [1, 16, 50]. This study substantiates the positive correlation between a firm's organizational capabilities and business strategy formation.

The findings demonstrate that marketing intelligence capability have positive effects on the formation of both cost leadership strategy and differentiation strategy, which could further lead to competitive advantage [3, 21]. Therefore, the study serves to inform business managers that firms should do more than just invest in marketing operations. They need to identify and build distinctive capabilities and put them in productive use. This study suggests that marketing intelligence capability is worthy of attention in this regards. The findings that marketing intelligence capability may impact business strategy formation indicate that its influence on a firm are cross-functional and may transcend managerial hierarchy.

From the managerial implication perspective, the marketing department in a firm is skillful at sensing and understanding the outside environment. If a business strategy of a firm can fit into its surroundings, its performance is usually enhanced. Thus, a marketing department in a firm becomes critical for a firm to make its business strategies fit with its surroundings. Our findings suggest that marketing intelligence capability can facilitate the marketing department of a firm for the generation, dissemination and analysis of marketing intelligence, so as to help shaping the firm's business strategy for competitive advantage.

Finally, our findings indicate the similar effects of marketing intelligence capability on the two types of business strategies. Both cost leadership strategy formation and differentiation strategy formation are positively influenced by marketing intelligence capability, regardless of the strategy typology. In essence, marketing intelligence capability and its output, marketing intelligence, enable firms to anticipate and understand better the customer needs and the competitive situation, to process this information faster and to develop products and services with lower cost or with differentiated features, which empower firms to sustain a competitive advantage.

5.2 Study Limitations and Further Research

Although this study reported meaningful implications regarding the development of multidimensional measures of constructs in our hypothesized framework, it should be realized that the validity of an instrument cannot be firmly established on the basis of a single study. In this study, all data used for tests were collected from firms based in Taiwan. Therefore, practitioners and academics are suggested to interpret our findings as a reference model rather than generalizing our measures to different research context.

Further research is suggested to investigate the relative importance of the factors affecting each stage of the strategy shaping process. These efforts should involve studies identifying the organizational capabilities which affect business operation, information processing, and decision support. The analysis of these data may enable conclusions to be drawn about more generalized relationships among business level strategy, functional level strategy and organizational capability. In addition, special attention could be focused on how emergent innovative technologies such as cloud computing, big data analytics and Internet of Things [51-55] affect the development of marketing intelligence capability.

References

[1] R. M. Grant, "The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation," *California Management Review,* vol. 33, pp. 114-135, Spring91 1991.

[2] D. J. Teece, G. Pisano, and A. Shuen, "Dynamic Capabilities and Strategic Management," *Strategic Management Journal,* vol. 18, pp. 509-533, 1997.

[3] M. E. Porter, *Competitive advantage*. New York: Free Press, 1985.

[4] C. B. Dobni and G. Luffman, "Determining the scope and impact of market orientation profiles on strategy implementation and performance," *Strategic management journal,* vol. 24, pp. 577-585, 2003.

[5] G. S. Day and R. Wensley, "Marketing Theory with a Strategic Orientation," *Journal of Marketing,* vol. 47, pp. 79-89, 1983.

[6] P. Guenzi and G. Troilo, "Developing marketing capabilities for customer value

creation through Marketing–Sales integration," *Industrial Marketing Management,* vol. 35, pp. 974-988, 2006/11/01/ 2006.

[7] D. Rouziès and J. Hulland, "Does marketing and sales integration always pay off? Evidence from a social capital perspective," *Journal of the Academy of Marketing Science,* vol. 42, pp. 511-527, September 01 2014.

[8] Y. Wang and H. Feng, "Customer relationship management capabilities," *Management Decision,* vol. 50, pp. 115-129, 2012 2012.

[9] S.-M. Tseng, "Knowledge management capability, customer relationship management, and service quality," *Journal of Enterprise Information Management,* vol. 29, pp. 202-221, 2016 2016.

[10] A. Respício and M. E. Captivo, "Marketing-production Interface through an Integrated DSS," *Journal of Decision Systems,* vol. 17, pp. 119-132, 2008 2008.

[11] W. Chang, J. E. Park, and S. Chaiy, "How does CRM technology transform into organizational performance? A mediating role of marketing capability," *Journal of Business Research,* vol. 63, pp. 849-855, 2010/08/01/ 2010.

[12] K. J. Trainor, M. T. Krush, and R. Agnihotri, "Effects of relational proclivity and marketing intelligence on new product development," *Marketing Intelligence & Planning,* vol. 31, pp. 788-806, 2013 2013.

[13] P. Kotler, "From sales obsession to marketing effectiveness," *Harvard Business Review,* vol. November-December, pp. 67-75, 1977.

[14] A. K. Kohli and B. J. Jaworski, "Market Orientation: The Construct, Research Propositions, and Managerial Implications," *Journal of Marketing,* vol. 54, pp. 1-18, 1990.

[15] B. J. Jaworski and A. K. Kohli, "Market Orientation: Antecedents and Consequences," *Journal of Marketing,* vol. 57, pp. 53-70, 1993.

[16] G. S. Day, "The Capabilities of Market-Driven Organizations," *Journal of Marketing,* vol. 58, pp. 37-52, 1994.

[17] N. A. Morgan, R. J. Slotegraaf, and D. W. Vorhies, "Linking marketing capabilities with profit growth," *International Journal of Research in Marketing,* vol. 26, pp. 284-293, 2009.

[18] B. Ettorre, "Managing competitive intelligence," *Management Review,* vol. 84, p. 15, Oct 1995 1995.

[19] S. F. Slater and J. C. Narver, "Intelligence generation and superior customer value," *Journal of the Academy of Marketing Science,* vol. 28, p. 120, December 01 2000.

[20] S. F. Slater, E. M. Olson, and G. T. M. Hult, "The Moderating Influence of Strategic Orientation on the Strategy Formation Capability-Performance Relationship," *Strategic Management Journal,* vol. 27, pp. 1221-1231, 2006.

[21] M. E. Porter, *Competitive strategy*. New York: Free Press, 1980.

[22] E. Claver-Cortés, E. M. Pertusa-Ortega, and J. F. Molina-Azorín, "Characteristics of organizational structure relating to hybrid competitive strategy: Implications for performance," *Journal of Business Research,* vol. 65, pp. 993-1002, 2012.

[23] A. McAfee and E. Brynjolfsson, "Big data - The management revolution," *Harvard Business Review,* vol. October, pp. 1-9, 2012.

[24] H. Mintzberg, "Strategy formation in an adhocracy," *Administrative Science Quarterly* vol. 30, pp. 160-197, 1985.

[25] H. Mintzberg and J. A. Waters, "Of strategies, deliberate and emergent," *Strategic Management Journal,* vol. 6, pp. 257-272, 1985.

[26] M. Janssen, H. van der Voort, and A. Wahyudi, "Factors influencing big data decision-making quality," *Journal of Business Research,* vol. 70, pp. 338-345, 2017.

[27] S. Akter, S. F. Wamba, A. Gunasekaran, R. Dubey, and S. J. Childe, "How to improve firm performance using big data analytics capability and business strategy alignment?," *International Journal of Production Economics,* vol. 182, pp. 113-131, 2016.

[28] M. E. Porter and V. E. Millar, "How information gives you competitive advantage," *Harvard Business Review,* vol. 63, pp. 61-78, July/August 1985.

[29] C. B. Li and J. J. L. Li, "Achieving superior financial performance in China: Differentiation, cost Leadership, or both?," *Journal of International Marketing,* vol. 16, pp. 1-22, 2008.

[30] C. V. L. Hill, "Difierentiation versus low cost or differentiation and low cost: A contingency framework," *Academy of Management Review,* vol. 13, pp. 401-412, 1988.

[31] A. I. Murray, "A contingency view of Porter's "generic strategies"," *Academy of Management Review,* vol. 13, pp. 390-400, 1988.

[32] K. Xie, Y. Wu, J. Xiao, and Q. Hu, "Value co-creation between firms and customers: The role of big data-based cooperative assets," *Information & Management,* vol. 53, pp. 1034-1048, 2016.

[33] C. B. Jarvis, S. B. MacKenzie, and P. M. Podsakoff, "A critical review of construct indicators and measurement model misspecification in marketing and consumer research," *Journal of consumer research,* vol. 30, pp. 199-218, 2003.

[34] A. K. Kohli, B. J. Jaworski, and A. Kumar, "MARKOR: A Measure of Market Orientation," *Journal of Marketing Research,* vol. 30, pp. 467-477, 1993.

[35] J. C. Narver and S. F. Slater, "The Effect of a Market Orientation on Business Profitability," *Journal of Marketing,* vol. 54, pp. 20-35, 1990.

[36] D. W. Vorhies, R. E. Morgan, and C. W. Autry, "Product-market strategy and the marketing capabilities of the firm: impact on market effectiveness and cash flow performance," *Strategic Management Journal,* vol. 30, pp. 1310-1334, 2009.

[37] G. G. Dess and P. S. Davis, "Porter's (1980) Generic Strategies as Determinants of Strategic Group Membership and Organizational Performance," *Academy of Management Journal,* vol. 27, pp. 467-488, 1984.

[38] R. B. Robinson and J. A. Pearce, "Planned Patterns of Strategic Behavior and Their Relationship to Business- Unit Performance," *Strategic Management Journal,* vol. 9, pp. 43-60, 1988.

[39] J.-J. Wu, "Influence of market orientation and strategy on travel industry performance: an empirical study of e-commerce in Taiwan," *Tourism Management,* vol. 25, pp. 357-365, 2004.

[40] D. Miller, "Relating porter's business strategies to environment and structure: analysis and performance implications," *Academy of Management Journal,* vol. 31, pp. 280-308, 1988.

[41] D. Miller, "Configurations of Strategy and Structure: Towards a Synthesis," *Strategic Management Journal,* vol. 7, pp. 233-249, 1986.

[42] H. Liu, W. Ke, K. K. Wei, J. Gu, and H. Chen, "The role of institutional pressures and organizational culture in the firm's intention to adopt internet-enabled supply chain management systems," *Journal of Operations Management,* vol. 28, pp. 372-384, 2010.

[43] H. H. Teo, K. K. Wei, and I. Benbasat, "Predicting intention to adopt interganizaitonal linkages: an institutional perspective " *MIS Quarterly,* vol. 27, pp. 19-49, 2003.

[44] J. S. Armstron and T. S. Overton, "Estimating Nonresponse Bias in Mail Surveys," *JMR, Journal of Marketing Research (pre-1986),* vol. 14, p. 396, Aug 1977 1977.

[45] L. Cronbach, "Coefficient alpha and the internal structure of tests," *Psychometrika,* vol. 16, pp. 297-334, 1951.

[46] J. C. Nunnally and I. H. Bernstein, *Psychometric theory*, 3 ed. New York: McGraw-Hill, 1994.

[47] D. V. Cicchetti, K. Koenig, A. Klin, F. R. Volkmar, R. Paul, and S. Sparrow, "From Bayes through marginal utility to effect sizes: a guide to understanding the clinical and statistical significance of the results of autism research findings," *J Autism Dev Disord,* vol. 41, pp. 168-74, Feb 2011.

[48] D. W. Straub, "Validating instruments in MIS research," *MIS Quarterly,* vol. 13, pp. 147-169, 1989.

[49] D. Campbell, T. and D. Fiske, W., "Convergent and discriminant validation by the multitrait-multimethod matrix," *Psychological Bulletin,* vol. 56, pp. 81-105, 1959.

[50] T. Ravichandran and C. Lertwongsatien, "Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective," *Journal of Management Information Systems,* vol. 21, pp. 237-276, 2005.

[51] D. A. Battleson, B. C. West, J. Kim, B. Ramesh, and P. S. Robinson, "Achieving

dynamic capabilities with cloud computing: an empirical investigation," *European Journal of Information Systems,* vol. 25, pp. 209-230, May 2016 2016.

[52] W. H. Weng, W. T. Lin, and W. T. Weng, "Forecast of Development Trends in Cloud Computing Industry," in *Proceedings of the Institute of Industrial Engineers Asian Conference 2013*, Taipei, 2013, pp. 641-648.

[53] M. Gupta and J. F. George, "Toward the development of a big data analytics capability," *Information & Management,* vol. 53, pp. 1049-1064, 2016/12/01/ 2016.

[54] W. H. Weng and W. T. Lin, "Development assessment and strategy planning in mobile computing industry," in *2014 IEEE International Conference on Management of Innovation and Technology*, Singapore, 2014, pp. 453-457.

[55] M. E. Porter and J. E. Heppelmann, "How smart, connected products are transforming companies," *Harvard Business Review,* vol. 93, pp. 96-16, 2015.