ATLANTIS PRESS
Atlantis Highlights in Engineering (AHE), volume 2
International Conference on Industrial Enterprise and System Engineering (IcoIESE 2018)

An Analysis of Core Competencies and Business Performances in Software SMEs : A Conceptual Framework

Atya Nur Aisha[1,2]
[1]Department of Industrial Engineering
Telkom University
Bandung, Indonesia
atyanuraisha@gmail.com

Iman Sudirman[2], Joko Siswanto[2], Yassierli[2]
[2]Department of Industrial Engineering
Bandung Institute of Technology
Bandung, Indonesia

***Abstract*—The SME needs to determine and develop its superior internal capability to survive the high competition. This study aims to develop a conceptual model that could be used to understand the relationship between the core competencies and the business performances in relation with the external conditions of software SMEs' environment. This study used relevant literature from previous studies to develop the conceptual model. The typical characteristic of the software business affected the different dimensions of core competencies and business performance from the previous studies. The result of this study proposed a conceptual model that describes the relationship among core competencies, organizational environments, and business performances.**

Keywords—core competencies, business performance, organizational environment, software business

I. INTRODUCTION

In recent years, the emerging economic sector in Indonesia is creative economy with 4.38% growth in 2015 and contributes to 7.38% of the total national economy [1]. One of the subsectors that contribute to the economic sector is the software industry with a 2% contribution to GDP, absorbing 69,451 workers [2], and the highest foreign investment rate in the creative economy of 0.95% [1]. This condition is supported by the 10.88% of the business growth in the information and communication sector in 2017 [3]. Software sub-sector has a role in economic development in Indonesia [4]. The growth of this industry is influenced by the globalization which increases the needs for information technology, including software products/services [5]. The software has transformed work and activities within organizations, business, also society, and becoming an important part of our society [6].

In Indonesia, the software business has an excellent potential to be developed based on the internet penetration rate in Indonesia of 34.9%, of which 85% of users access the internet via mobile phone for social networking [7]. Higher access to smartphones gives impact on the demand for software products such as mobile apps that increase significantly [8]. The increase in the needs of the company is also evident in the value of IT service contracts that reached 1.2 billion US $ in 2014 for System Integration and Custom Application Development [9]. Also, Indonesia has potential resources in the field of large information technology. The potential resource in this area is the human resources in which there are approximately 25.000 graduates having expertise in IT from more than 200 higher education institutions in Indonesia [5]. The existence of human resources from educational institutions becomes essential in the development of the software industry sector [1,10].

However, there are some obstacles in developing software business, such as increased global competition, innovation demands, various customer needs [11], and the life cycle of technology products are getting shorter [12]. In addition to these conditions, there are several other obstacles for software business in Indonesia namely limited access to funding, lack of ideas for product development, and difficulty in business network [5].

It is necessary to focus on the internal strengths, namely core competencies to face the competitions [11,13]. The possession of unique and difficult-to-imitate competencies, derived from the complex combination of interlinked processes, routines, technologies and individual skills. These competencies can produce a superior performance for the firm [14]. Focusing on core competencies makes the firm establish business networks to gain knowledge beyond the specialized skills required to deliver value to customers [11].

Along with the increasing competitions and changes in environmental factors, the firm's competitive advantage may be lost due to technological changes or changes in market conditions [14,15]. Meanwhile, to develop the core competencies, it requires a high investment cost. This high investment is needed to undertake research and development of the company's technology capabilities, training to develop resources, and management of learning processes within the organization play a role in the development of core competencies of the enterprise. Core competencies describe the company's internal capabilities that cannot be obtained through "rented" outsourcing [16]. According to the data, some obstacles that faced by SMEs in the creative economy sector are research and development (37.40%) and education (31.56%)[1]. This barrier happens due to limited funds owned by the SMEs.

Therefore, it is important to understand the environmental context that may impact the firm's core competencies [14]. Environmental factors can have moderating effect in the relationship between core competencies and business performances.

Some previous studies have examined the relationship between core competencies and firm performances [14,16-18]. Most of the studies used core competencies that refer to functional activities. Ethiraj, et. al [17] examines the dimensions of core competencies in the operational context. In this study, the core competencies related to functional and operational activities must be included along with the software business characteristics. In the software value chain developed by Pussep, et al [19] major activities in software business include functional activities (such as product research, product development, component procurement, production and packaging, marketing) as in general companies, and specific operational activities related to software development (consisting of user documentation, implementation, training and certification, maintenance and support, operations, and replacement). In addition, most of the software business conducted project-based job for software services business and hybrid software business [6]. Those different main activities in the software business lead to needs for identification of core competency dimensions that are appropriate for the firm conditions.

In the previous studies, the indicators that used to measure firm performance is related to financial aspects, such as income [16,17], as well as total profits [18]. However, measuring firm performance that is only based on financial indicators still has weaknesses because it does not represent the firm actual conditions [20]. Rajkovic and Prasnikar [21] use nonfinancial performance indicators, which is the total number of patents for measuring business performance. Therefore, a comprehensive multidimensional set of measurements that include financial and nonfinancial indicators are required to represent the overall organizational conditions [13,22,23]. One of the multidimensional frameworks for performance measurement that can be used is Holistic Scorecard. This framework consists of six perspectives that related with the software industry, namely financial, customer, business process, employee, intellectual capital and social [22].

The software industry has some challenges such as dynamic environmental conditions and rapid changes both from the market, customers, and technology. These changes affected the firm's strategy to adapt its internal competencies development with the organizational environment context. The typical characteristics of this industry such as having minimal assets and focusing on human resources, make the business performance measurement need to include financial and nonfinancial aspects. Based on the explanation, it is interesting to examine the dimensions of the core competencies that can improve business performance in accordance with the organizational environment context.

The paper outlines as follow; the first section introduced the background of this study. The second section presented literature review conducted for this study, and then in the third section proposed the conceptual model to be discussed in this study. The final section discussed conclusion and future research.

II. Literature Review

A. Core Competencies

Core competencies are defined as the accumulation of learning in the internal organization that related with the ability to coordinate diverse production skills and integrate different streams of technology, in order to generate competitive advantage. There are three characteristics of core competencies, namely can access various potential markets, difficult to imitate by the competitors, and contributed to customer value [16]. Other core competencies characteristics are the main strength of the organization, focusing on key business areas, align with the vision, mission, strategy and organizational value [13].

Core competencies resulted from internal capabilities that are developed routinely in the organizations, cannot be replaced, not easily obtained externally [15], and can be used to distinguish between the firm and other competitors [24]. However, along with the level of competition and changes in environmental factors, the firm's competitive advantage can be lost due to technological changes or changes in market conditions. To maintain this competitive advantage, the firm's need to identify the potentially sustainable core competencies [15].

Several previous studies have explored core competencies, at the functional level [14,16,18,21] as well as operations level [17,25]. Core competencies have the most significant influence on organizational performance comparing with other factors, such as knowledge management strategy [26].

Different research objects can bring different results in the dimensions of core competencies. The dimensions of technological competencies, marketing competencies, and integrative competencies are used as core competencies in companies that produce standardized products in various sectors, such as IT [14,16,18] and manufacturing [21,27]. While the software business mostly conducts project-based work, then it will need other dimensions of core competencies. The key capability needed to manage project-based work is project management and networking with partners [6]. Therefore, there are two other core competencies that are considered important for software business namely project management competencies [17,25] and network competencies [18].

The elaboration results of previous studies related to core competencies dimensions can be seen in Table I.

TABLE I. Dimensions of Core Competencies

Dimensions	Definition	Researcher
Technological Competencies	Technological competencies are related to the firm's ability to utilize technology and adapt to changes in the environment to produce and develop products that align with potential markets.	[14,16,18,21,27]

Dimensions	Definition	Researcher
Marketing Competencies	Marketing competencies represent the capabilities needed to understand the changing needs of consumers and the competition that occurs in the market, establish new products/services, and the way to interact with customers.	[14,16,18,21]
Integrative Competencies	Integrative competencies are the ability to coordinate and align inter-functional processes with the corporate strategy, in order to produce an effective and efficient process.	[14,21]
Network Competencies	Network competencies refer to firm's ability to build relationships with external parties for obtaining information and minimize the uncertainty of changes in the environment.	[18]
Project Management Competencies	Project management competencies demonstrate the necessary capabilities related to technical and managerial aspects in the field of software design, development and implementation, and maintaining the continuity of service projects provided.	[17,25]

B. Business Performance

Business performance represents the accomplishment of something desired, expected or planned [23]. In the previous studies examining the relationship between core competencies and business performances, the performance indicators used were financial indicators: income [16,17], and total profits [18], as well as nonfinancial indicators: the number of patents [21].

In dynamic environmental conditions, the performance measurement framework may predict the achievement of positive performance and represent performance in the previous period. This objective cannot be obtained from financial indicators only [28]. A more comprehensive framework of performance measurement may represent the overall condition in the organization [13]. There are two frameworks of multidimensional performance measurement that can be used to measure the business performance in the software industry, namely the Balanced Scorecard and the Holistic Scorecard.

Papalexandris, et al. [29] used the Balanced Scorecard framework (consisting of four perspectives: financial, customer, internal business processes, and growth and learning) to measure the performance of a software firm in Greece. While Soini, et al. [30] focuses the measurement of software business performance on the growth and learning perspective, because of the important aspects of human resources in the software business, especially in software development process.

However, several researchers said that the framework of the Balanced Scorecard is still incomplete, so it required some adjustments and additions to performance perspectives. In the nowadays situation, there is a need for additional perspectives related to the impact of the company on society and the environment [31].

In software business with dynamic and uncertain environment characteristics, an open system and easy to adapt performance measurement framework are required. In addition, in this business, intangible assets are measured not only by the human capital but also the intellectual assets related to the patents/licenses/copyrights as a result of research and development activities [22].

Accommodating the typical characteristics of the software business, the Holistic Scorecard can be used to measure the business performance. This framework consists of six perspectives namely financial, customer, business process, intellectual capital, employee and social [22,23]. This framework adopted the concept of the Balanced Scorecard, but there are some adjustments, such as three additional perspectives: intellectual assets, workers and social as new considerations that reflect some of the key points that may affect the performance of a software business [23].

The elaboration results of previous studies related to business performance dimensions can be seen in Table II.

TABLE II. DIMENSIONS OF BUSINESS PERFORMANCE IN SOFTWARE SMES

Dimensions	Definition	Researcher
Financial	This perspective represents the ultimate goal of the firm that can be measured objectively.	[22,23,29]
Customer	This perspective reflects the value of the firm that will be delivered to the customer in order to achieve firm's vision.	[22,23,28,29]
Business Process	This perspective is related to firm's internal processes that need to be excellence in order to deliver value for customers and meet customer's expectations.	[22,23,28,29]
Employee	This perspective reflects the firm's ability to obtain and manage human resources optimally in order to provide professional growth and satisfaction for the employee as the main asset in the software firm.	[22,30]
Intellectual Capital	This perspective covers the firm's intangible assets that protected by property rights and become a source of competitive advantage for the firm.	[22,23]
Social	This perspective represents firm's ability to contribute to the larger society in terms of environmental protection, corporate citizenship, and social responsibility.	[22,31]

C. Organizational Environment

Organizational environment reflected all elements outside the boundaries of the organization that has the potential to give a direct impact on organization ability to achieve goals [32]. There are several environmental factors that can affect the organization performance, such as market [14,20,32], financial access [20,27], technology [14,29,32], as well as government

support [18,20]. Environmental factors can affect the business performance in direct effect [20] or moderated effects between performance and another variable, such as core competencies [14,18,27].

Nowadays software business faces some challenges such as shorter product lifecycle, growth of new technology and the dynamic changes of customers' needs. This condition happened due to dynamic technological and market changes [12]. Changes in these two environmental factors can affect the firm's core competencies dimensions to the strength of the firm [14].

In the software business, government support also affected the business performance. Government support through policies and incentives can facilitate the establishment and development of business [20]. Policies issued by governments will affect processes managed within the firms [32]. Government factors have also been one of the key success factors in the development of India's software industry [10,33]. The existence of the vision and mission of the government to develop the software industry, as well as the policies issued to support business, encourage the development of this sector [33]. Alignment between the firm's internal activities with government policy can increase the business performance [18].

III. Conceptual Model and Hypotheses Development

Based on the description in the introduction and literature review section, the research model consists of two constructs namely core competencies and business performances. Core competencies consist of technological competencies, marketing competencies, integrative competencies, network competencies, and project management competencies. Business performances are measured by financial, customer, business process, intellectual capital, employee and social perspectives. Organizational environment factors that used in this study were market, technology, and government support. Figure 1 illustrates the proposed conceptual model for this research.

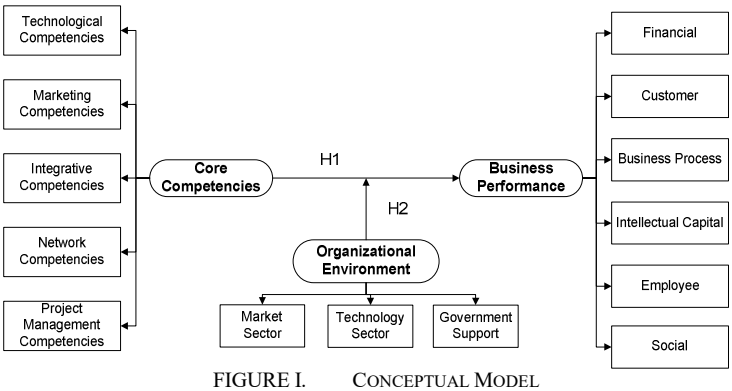

FIGURE I. CONCEPTUAL MODEL

To survive in the business competition, strengthening internal capabilities become the top priority for business development. One important aspect of internal capability to be developed is core competencies [15]. To produce superior performance, firms need to manage their core competencies efficiently [34]. Core competencies are related to the main activities that can support the success of the firms performance [16]. Previous studies can prove the direct effect of core competencies on business performance that measured by financial indicators [14,16,17,18]. However, in the study of Muhammad, et al. [27] influence of core competencies on business performance cannot be proven significantly. This condition happened due to the measurement of core competencies was performed on each dimension.

Core competencies resulted from capabilities integrated across functional lines and the most important constituents of business processes. Superior core competencies reflected that firm may have unique and hard-to-imitate capabilities, which usually span over multiple products or markets [15]. This condition enables the firm to create and deliver the innovative products/services based on customer needs that impact on the purchasing decision of the firm and determine business performance [14]. In the software business, both of products and services rely on the requirements and needs of the customers [6]. Therefore, the firm's ability to manage and utilize internal aspects (such as human capital and organizational capital) will have an impact on the business performance. Therefore, the following hypothesis can be proposed:

H1: Core competencies have a positive impact on business performances

In the dynamic environment, the core competencies may be lost due to technological or social changes in the markets [15]. This change can neutralize or dissipate the effect of core competencies on business performance [14]. Some organizational environment challenges faced by software firms are rapid innovation, technological changes, shorter product life cycles, and dynamic product demands from the customer. The success of any firms engaged in this industry is supported by the firm's ability to adapt to environmental changes [35]. In addition, alignment between the company's internal activities and government policies can support the improvement of business performance [18]. A firm should pay great effort in achieving superior performance in a more cost effective manner by seeking the appropriate level of specific competencies that match the level of environment conditions [14]. Based on the description, here is the following hypothesis:

H2: Organizational environment have a moderate impact on the relationship between core competencies and business performances

IV. Research Design

The research will be conducted using a quantitative approach. The questionnaire used for data collection consists of four sections: general information, core competencies, business performances, and organizational environment.

Several previous literatures are used as the basis in the preparation of the questionnaires. The measurement items that will be used to measure core competencies refer to [14,17,18,21], to measure business performance refer to [22,23], while the organization's environment refer to [14,27,32]. Questionnaires will be answered by owners and/or managers who understand the capabilities and conditions of the organization.

The research location will be conducted in Bandung because in this city there are several digital creative centers and business incubators [2]. The city also has educational institutions offering study programs in the field of information technology in which this can be the source for the development of an innovation center of IT field, especially industrial software [37]. However, the number of business population in the software industry in Bandung remains indefinite. Therefore, this study employed the quota sampling approach. The minimum required sample size is 59, referring to the estimated number of samples based on the relationship to be proven [38].

Data processing in this research will use SEM (Structural Equation Modeling) with an approach of Partial Least Squares Approach (PLS), which focuses on the analysis of variance because some latent variables cannot be measured directly. PLS is useful for structural equation modeling in applied research projects [38] and for examining the moderating effects of latent variables [14]. This approach is also used for data processing in the previous research [14,18].

V. Conclusion

One of the strategies to overcome the obstacles faced by the software business is developing the internal capability, namely core competencies within the organization. However, to develop core competencies requires substantial costs that become a barrier especially for SMEs. Therefore, the firms need to determine the core competencies that align with the environmental conditions in order to produce a superior business performance. In this study, we proposed a conceptual model that can help to understand the relationship between core competencies, external environment, and business performances that related with software SMEs context.

As the continuation of the proposed model, we will develop a questionnaire based on the operationalization of the variables to gather data. The questionnaires will be distributed to software SMEs. The questionnaires containing closed questions will be answered by a person who represents and understands the conditions in their SMEs, such as owner, manager, or owner-manager of the SMEs.

Then, we will investigate the core competencies related to business performance in software SMEs. We will also identify the organizational environment that affects the relationship of core competencies and business performances.

References

[1] Indonesian Creative Economy Agency (Bekraf). Statistical Data and Creative Economic Survey Results. Jakarta: Indonesian Creative Economy Agency, 2017.

[2] Ministry of Tourism and Creative Economy. Creative Economy: Medium Term Action Plan 2015-2019. Jakarta: Ministry of Tourism and Creative Economy, 2014.

[3] Central Bureau of Statistics (BPS). Press Release August 2017. Jakarta: Central Bureau of Statistics, 2017.

[4] A. N. Aisha, J. Siswanto, and I. Sudirman. "Competencies model for entrepreneur development in software industries." In 2016 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), pp. 184-188. IEEE, 2016.

[5] Kristiana. “Analysis of software sector conditions in Indonesia with triple helix approach to support the development of creative economy”, Quality Journal, vol. 3, no. 17, 2015.

[6] M. Bertram and H. von Korflesch, Strategic Role of Software Customization, Koblenz : Springer Fachmedien Wiesbaden, 2016, pp. 1-4.

[7] Association of Indonesian Internet Service Providers (APJII). Indonesian Internet User Profile 2014. Jakarta: Association of Indonesian Internet Service Providers, 2015.

[8] M. Mandel. “Indonesia: Road to the app economy.” Policy Brief – Progressive Policy Institute, September 2015.

[9] International Data Corporation (IDC). Indonesia ICT Market Landscape Study. Selangor: IDC Malaysia, 2016.

[10] A. Arora, and A. Gambardella, The Globalization of Software Industry: Perspectives and Opportunities for Developed and Developing Countries. Cambridge: National Bureau of Economic Research, 2004.

[11] R. Rajala and M. Westerlund. "Business models–a new perspective on firms' assets and capabilities: observations from the Finnish software industry." The International Journal of Entrepreneurship and Innovation, vol. 8, no. 2, pp. 115-125, 2007.

[12] R. Aryanto, A. Fontana, and A. Z. Afiff. "Strategic human resource management, innovation capability and performance: An empirical study in Indonesia software industry." Procedia-Social and Behavioral Sciences, vol. 211, pp. 874-879, 2015.

[13] R. K. Lahti,. "Identifying and integrating individual level and organizational level core competencies." Journal of Business and Psychology, vol. 14, no. 1, pp. 59-75, 1999.

[14] Y. Wang, H. P. Lo, and Y. Yang. "The constituents of core competencies and firm performance: evidence from high-technology firms in China." Journal of Engineering and Technology Management, vol. 21, no. 4, pp. 249-280, 2004.

[15] K. Hafeez, Y. B. Zhang, and N. Malak. "Core competence for sustainable competitive advantage: a structured methodology for identifying core competence." IEEE transactions on engineering management, vol. 49, no. 1, pp. 28-35, 2002.

[16] C. K. Prahalad, and G. Hamel. The core competence of the corporation. Boston, 1990, pp. 235-256.

[17] G. Duysters, and J. Hagedoorn. "Core competences and company performance in the world-wide computer industry." The Journal of High Technology Management Research, vol. 11, no. 1, pp. 75-91, 2000.

[18] S. K. Ethiraj, P. Kale, M. S. Krishnan, and J. V. Singh. "Where do capabilities come from and how do they matter? A study in the software services industry." Strategic management journal, vol. 26, no. 1, pp. 25-45, 2005.

[19] D. Roh, and H. Y. Park. "The influence of core competence on organizational performance of IT small and medium enterprises: the moderating role of entrepreneurship and government support." Journal of the Korea society of IT services, vol. 14, no. 1, pp. 23-40, 2015.

[20] A. Pussep, M. Schief, T. Widjaja, P. Buxmann, and C. M. Wolf. "The software value chain as an analytical framework for the software industry and its exemplary application for vertical integration measurement." In Proceedings of the Seventeenth Americas Conference on Information Systems, pp. 1-9, 2011.

[21] D. O. Gomezelj, and I. Kušce. "The influence of personal and environmental factors on entrepreneurs' performance." Kybernetes, vol 42, no. 6, pp. 906-927, 2013.

[22] T. Rajkovič, and J. Prašnikar. "Technological, marketing and complementary competencies driving innovative performance of Slovenian manufacturing firms." Organizacija, vol 42, no. 3, pp. 77-86, 2009.

[23] G. S. Sureshchandar, and R. Leisten. "Holistic scorecard: strategic performance measurement and management in the software industry." Measuring Business Excellence, vol. 9, no. 2, pp. 12-29, 2005.

[24] P. Clarke,and R. V. O'Connor. "The meaning of success for software SMEs: A holistic scorecard based approach." In European Conference on Software Process Improvement, pp. 72-83, 2011.

[25] G. Uysal, "Core competence: a competitive base for organizational success". Journal of Global Strategic Management, vol. 1, no.1, pp. 5-16, 2007.

[26] P. Banerjee, "Some indicators of dynamic technological competencies: understanding of Indian software managers." Technovation, vol. 23, no. 7, pp. 593-602, 2003.

[27] Z. Yu, W. Y. Fei, and L. H. Lin. "Empirical study on interaction among knowledge management strategy, core competence and organizational performance." In 2006 International Conference on Management Science and Engineering, 2006. ICMSE'06, pp. 1269-1273. IEEE, 2006.

[28] N. M. N. Muhammad, M. Jantan, and C. C. Keong. "Technology strategy and firm's revenue growth: empirical evidence of Malaysian industrial automation industry." International Journal of Business and Management, vol. 3, no. 7, 2009.

[29] S. Mair.. "A balanced scorecard for a small software group." IEEE software, vol. 19, no. 6, pp. 21-27, 2002.

[30] A.. Papalexandris, G. Ioannou, and G. P. Prastacos. "Implementing the balanced scorecard in Greece: a software firm's experience." Long Range Planning, vol. 37, no. 4, pp. 351-366, 2004.

[31] J. Soini, H. Keto, and T. Makinen. "An approach to monitoring the success factors in software business in small and medium size software companies." In Technology Management for the Global Future PICMET 2006, vol. 6, pp. 2801-2808. IEEE, 2006.

[32] M. Olaru, I. C. Pirnea, A. Hohan, and M. Maftei. "Performance indicators used by SMEs in Romania, related to integrated management systems." Procedia-Social and Behavioral Sciences, vol. 109, pp. 949-953, 2014.

[33] R. Daft, Organization Theory and Design, 10th Edition. South Western: Cengage Learning, 2010, pp. 140-143.

[34] P. M. Madhani, "Indian software success story : a resource-based view of competitive advantages". The Icfaian Journal of Management Research, vol. 7, no. 8, pp. 61-83, 2008.

[35] I. S. Neganova, "Managing core competences to create value for customers." World Review of Entrepreneurship, Management and Sustainable Development, vol. 6, no. 4, pp. 304-317, 2010.

[36] E. Bernroider, "Factors in SWOT analysis applied to micro, small-to-medium, and large software enterprises: an Austrian study." European Management Journal, vol. 20, no. 5, pp. 562-573, 2002.

[37] N. Bruell, "Exporting software from Indonesia." The Electronic Journal on Information Systems in Developing Countries, vol. 13, no. 7, pp. 1-9, 2003.

[38] K. K. K. Wong, "Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS". Marketing Bulletin, vol. 24, no. 1, pp.1-32, 2013.