

The Conceptual of Knowledge Absorptive Capacity and the New Paradigm of Entrepreneurial Antecedents

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Abstract: Today, enterprises in the world faced to prosperities but within threatened and opportunities. Many researchers described absorptive capacity as crucial capability. This capability enables enterprises to recognize, understand, absorb, convey and utilize new external knowledge. Therefore, enterprise with higher level of absorptive capacity takes advantage to access higher level of new external knowledge. This phenomenon could lead enterprise to innovation, performance, flexibility or competitive advantage by lead form different and variety antecedents. In past decades, many researchers studied about different aspects as determinants of absorptive capacity, but in this subject still insight is limited and there are gap between absorptive capacity and other areas, which may have positive or negative effect on this capability. This paper highlighted last research, domain, recognize and significance of this capability as necessity construction in enterprises.

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1. Introduction

Nowadays, enterprises in the world faced to prosperities but within threatened and opportunities. Technological knowledge and information accessible and developing and become more complex with new challenges. Economic growth, enterprise opportunities make business environment, dynamic and develop competition in the market. In this transformation condition where ideas and commerce are based on new knowledge to investment and mobility, enterprises need to combine and integrate all capabilities. Hence, new knowledge plays the magical, significant and undeniable role in the process of innovation. Therefore, the process of knowledge absorption as first and beginning stage to learning new knowledge form external sources is needed and considerable.

Zahra and George (2002) and Camison and Fores (2010) mentioned that conceptual of AC applied in the field of strategic management. Drucker (1980) described business environment with unstable and turbulent conditions. Celebi and Gozlu (2008) mentioned that technology strategy may decision in one of these areas: 1) changing definitions of new sources of competition or industries, 2) changing employee relations, 3) increased globalization of markets, 4) changing product life cycles, and 5) changing definition of market segments.

Barney (1991) described knowledge as the strategic source with four characters: 1) valuable, 2) rare, 3) inimitable, and 4) non-substitutable and mentioned enterprise, which absorbs new external knowledge has receptiveness conceptual of knowledge as the strategic source. In 1980, Porter in

book of Competitive Strategy pointed that each compete in an environment and industry with competitive strategy and the inherent of competitive strategy depend on its environment and include condition, which enterprises with higher level of capability in compare of its competitors also defined competition as the base of accomplishment for enterprise. It is obvious that AC is not aim by self, on the contrary; it is significant to a consequence of enterprise such as the competitive advantage (Zhu, Cai et al. 2006).

Superiority in the external resources' management necessitates that enterprise analysis elemental mission and vision to find a strategy to recognize external resources, which are significant to sustain flexibility in turbulent environment. This elemental analysis is foundation and significant to make a decision and arrangement which resources should be in-house and how enterprise can strength and manage it in business environment. Enterprise's abilities to plan a capability to apply new external knowledge via environment that it's construe enterprise' action (Nonaka, 1994). An enterprise to sustain competitive advantage and manage new external knowledge in turbulent business environment need to develop the capability of AC and should pass stages and process to strength this strategic resource.

2. Literature Review

2.1 What Is Absorptive Capacity?

In the past decades, this phenomenon how enterprises organize, appropriate and apply new external knowledge for development of technological knowledge (Cohen and Levinthal, 1990; Lane and

Lubatkin, 1990; Zahra and George, 2002; Liao et al., 2002; Zhixiong and Yuanjin, 2010; Zhou and Wu, 2010) innovations (Cohen and Levinthal, 1990, Stocka, et al., 2001; Zhu et al., 2006; Wang and Chen 2009; Escribano et al., 2009; Fabrizio, 2009; Zhixiong and Yuanjin, 2010; Schmidt, 2010; competitive advantage (Zahra and George, 2002; Andraw et al., 2008; Liu et al., 2009) to commercial ends (Cohen and Levinthal, 1990) is called Absorptive Capacity (AC). When Cohen and Levinthal in 1990 described AC, as the ability to expand and apply new information on commercial ends that totally is a function of prior related knowledge. In this time, they viewed on Ac as static ability, which continued until 2002. Then Zahra and George (2002) briefed another aspect of AC and introduced the theoretical framework of AC and promoted conceptual of AC as dynamic capability with four abilities, acquisition, assimilation, transformation, and exploitation. After recognition the construction of AC as necessity capability in enterprises, many researchers defined AC, Table 1 shows definition of AC by researchers.

Researchers mentioned to AC as capability that enables enterprise to manage external knowledge and create innovation (Zhou and Wu, 2010; Camison and Fores, 2010). Capability of AC is the sum of abilities that enables enterprise does acquisition, absorption, transformation and utilization new external knowledge (Zahra, and George, 2002; Zhixiong and Yuanjin, 2010). The significant aspect of AC is that new knowledge in out of enterprise's boundaries is not open and free to be simply absorbed without any effort by enterprises and apply it in new technology (Fabrizo, 2009). On the other hand, successful innovations are not created in vacuum, and it requires a significant level of organizational foundation that supports enterprise' function to be innovative (Jeong et al., 2006). Researchers also mentioned to conceptual of AC in different fields such as industrial organization, organizational learning, strategic management, and innovation management (Zahra and George, 2002; Camison and Fores, 2010).

Table 1: Definition of Absorptive Capacity

Date	Researcher (s)	Definition
1990	Cohen & Levinthal	"An ability to recognize the value of new information, assimilates it, and applies it to commercial ends."
1991	Barney	"The diverse capabilities give the firm a foundation on which to achieve a competitive advantage that yields superior performance."
1996	Mowery et al.	"A broad set of skills needed to deal with the tacit component of transferred knowledge and the need to modify a foreign-sourced technology for domestic applications."
1998	Koza & Lewin	"To gauge the ability of a firm to use outside knowledge."
1999	Bosch et al.	"The ability to recognize the value of external knowledge edge, assimilates it, and apply it to commercial ends."
2001	Nonaka & Nishiguchi	"Knowledge creation is function of organization's absorptive capacity."
2002	Zahra & George	"A set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability."
2006	Gray	"AC as internal routine phenomena, which dial with tacit and explicit knowledge that have affection from culture and competency of management."
2007	Todorova & Durisin	"A firm's capacity to value, acquires, assimilate or transform and exploit external knowledge."
2009	Zahra et al.	"Absorptive capacity denotes a firm's ability to identify, accumulate, process and use the new knowledge gained from external sources."
2009	Fabrizo	"The ability of the firm to make use of connections to external knowledge source."
2009	Harris & Liy	"The ability to exploit knowledge (obtained both internally and especially externally) that is embodied in intangible assets, with the latter being recognized as a key driver of enterprise performance."
2010	Schmidt	"A firm ability to deal with external knowledge."
2010	Camison & Fores	"A dynamic capacity that allows firms to create value and to gain and sustain a competitive advantage through the management of the external knowledge."
2010	Zhixiong & Yuanjin	"The collection of skills and knowledge that the enterprise acquires, absorbs, transforms and utilizes the external knowledge."

2.2 The Conception of Absorptive Capacity

Many researchers mentioned that the AC is crucial capability (Cohen and Levinthal, 1990; Barney, 1991; Mowery et al., 1996; Koza and Lewin, 1998; Bosch et al., 1999; Nonaka and Nishiguchi, 2001; Zahra and George, 2002; Gray, 2006; Todorova and Durisin, 2007, Zahra et al., 2009; Fabrizo, 2009; Harris and Liy, 2009; Schmidt, 2010; Camison and Fores, 2010; Zhixiong and Yuanjin, 2010). Vega-Jurado et al. (2008) published that

conceptualization of AC is applying, conveying new external knowledge technology between countries. They also briefed AC as phenomena to worldwide associate and maintainable competitive advantage via organization learning and innovation. Fabrizo (2009) published an article and mentioned that conception of AC considers to this reality that information in outside of enterprise' boundary is not openly in area to absorb simply without any effort by all enterprises to acquire and utilized it. Its mean new external

knowledge should recognize, understand, absorb, convey and utilize by enterprise (Cohen and Levinthal, 1990; Lane and Lubatkin, 1990; Zahra and George, 2002; Liao et al, 2002; Xiao and Qin, 2010), with professional members and skill workers in relevant subject by special parts of enterprise (Fabrizio, 2009). Enterprises are increasingly desiring the suggestion which knowledge create by internal activity and know it is fundamental for promote AC to access competitive advantage (Escribano et al., 2009).

Enterprise is successful, which in dynamic and turbulent environment can process and generate new external knowledge (Nonaka, 1994). Enterprises with first field of AC tend to knowledge spillovers and enterprises with first field of spillovers tendency to innovation (Zhu, Cai et al. 2006). Nowadays, AC knows by organization and scholars to kind of ability to improve the capability to apply external knowledge to sustain and jump to innovation. Escribano et al. (2009) claimed that the function of AC appears in conditions and situation with a high level of confusion and narrow existence of knowledge and suppose that knowledge absorbing process especially in this situation is most significant. Enterprise with high level of AC takes advantage to access high level of new external knowledge (Zahra and George, 2002; Zahra, et al., 2009), in contrast enterprise that exists without any attention to environment cannot benefit from AC and move to innovation because this process between AC and innovation interlaced and without AC this way is insignificant (Escribano et al., 2009). Recent evidence suggests that internally the knowledge process is the prerequisite of conveying and utilizing new external knowledge to innovating and sustainable enterprise's competitive advantage (Fabrizio, 2009).

2.3 The significant of Absorptive Capacity

New information and knowledge has increased in popularity and credibility as the important management tool for survival in business environment. Enterprises cannot rely on the internal research and innovating activities only and needed to be faster than before in absorbing external knowledge and innovation to challenges of environment (Cohen and Levinthal, 1990). AC as enterprise capability to digest external knowledge mentioned to establish the process for competitive advantage (Zahra and George, 2002). Zahra et al. (2009) suggests that AC has two roles; 1) generate riches, its mean AC gives the ability to identify, acquire, assimilate, transform and utilize new knowledge so enterprise emphasizes the capability of innovation. 2) Consider shielding investors' benefits, its mean higher level of AC decrease risk by descend strategic defect.

Cohen and Levinthal (1990); Bosch et al. (1999); Zahra and George (2002); Zhou and Wu (2010) described that AC is an internal capability, which has the external function to absorb new external knowledge. Zahra and George (2002) mentioned that the greater availability of this dynamic capability enables enterprises to target, absorb and deploy the external knowledge which necessary to feed the innovation process. They added that AC plays two roles; protect shareholder and create wealth, also decrease potential strategic errors.

Despite the growing use of the construct of AC, the study on this subject remains difficult because of the diversity and ambiguity of its components (Cohen and Levinthal, 1990; Zahra and George, 2002; Schmidt, 2010), antecedents (Bosch, 1999; Zahra and George, 2002; Jansen et al., 2005; Vega-Jurado et al., 2008; Peters and Johnston, 2009) and consequences (Dewar and Dutton, 1986; Zahra and George, 2002; Chesbrough, 2003; Fasnacht, 2009). Therefore, they highlighted domain and operationalization of AC as necessity capability in enterprise.

2.4 Components of Absorptive Capacity

Many scholars mention that AC is a multidimensional capability. Zhou and Wu (2010) stated enterprise, which wants to promote innovation should monitor environment to recognize new sources of knowledge, absorb, and apply it to product innovation obviously this process is the base of ability of enterprise to understand new external knowledge. Cohen and Levinthal (1990) defined AC within three dimensions as: 1) ability to recognition and value, 2) ability of assimilation, and 3) ability of commercialization. Zahra and George (2002) mentioned that all abilities of AC should implement to gather. Its mean may enterprise enables to acquire and assimilate new external knowledge but could not be able to transform or exploit it in commercial ends (Zahra and George, 2002). Therefore, capability of AC is not only depend on enterprise's external condition, at first it depends on enterprise's structure so enterprise should promote and investment to all dimensions of AC to commercial ends (Cohen and Levinthal, 1990; Zahra and George, 2002; Schmidt, 2005 and 2010). In another study, Bosch et al., (1999) also stated similar dimensions of knowledge absorption as 1) efficiency, 2) scope, and 3) flexibility. Peters and Johnston (2009) added another step as primarily the ability in the process of AC. They described AC within five abilities as; 1) realize, 2) acquire, 3) assimilate, 4) transform, and 5) exploit new external knowledge.

Cohen and Levinthal (1990); Lane and Lubatkin (1990); Zahra and George (2002), Liao et al. (2002); Zhixiong and Yuanjin (2010); Zhou and Wu

(2010); Camison and Fores (2010) mentioned that knowledge acquisition is the ability to identify and recognize the value of external knowledge that it needed to innovation. Zahra and George (2002) stated that acquisition refers to “a firm’s capability to identify and acquire externally generated knowledge that is critical to its operations”. Cohen and Levinthal (1990); Szulanski (1996); Zahra and George (2002); Zhixiong and Yuanjin (2010); Camison and Fores (2010) defined that knowledge assimilation is the ability to collect, understand, select most important information and make a decision to absorb knowledge. Zahra and George (2002) stated that assimilation refers to “firm’s routines and processes that allow it to analysis, process, interpret, and understand the information obtained from external sources”. Bosch et al. (1999); Zahra and George (2002); Zhixiong and Yuanjin (2010); Zhou and Wu (2010); Camison and Fores (2010) promoted that knowledge transformation is to internalize, conversion and develop new knowledge by add, eliminate or change, which needed to apply in innovation. Zahra and George (2002) claimed that transformation refers to “a firm’s capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge”. Cohen and Levinthal (1990); Lane and Lubatkin, (1990); Zahra and George, (2002); Liao et al., (2002); Zhixiong and Yuanjin (2010); Zhou and Wu (2010); Camison and Fores (2010) mentioned that knowledge exploitation is to harvest and apply new knowledge, which acquired, assimilated, and transformed into the innovative way. Zahra and George (2002) stated that exploitation refers to “an organizational capability based on the routines that allow firms to refine, extend, and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into its operations”.

According to Zahra and George (2002), potential AC includes abilities of knowledge acquisition and knowledge assimilation, and realized AC is abilities to knowledge transformation and knowledge exploitation.

2.5 Measurement of Absorptive Capacity

Schmidt (2010) state that measurement of AC is not simply by available knowledge, at first; propose using surveys to in firm levels and then mentioned to the fuzzy concept which evaluates AC directly in individual or organizational levels by self is not possible. In past decades, many scholars have attempted to brief measurement for capability and dimension of AC.

Cohen and Levinthal (1990); Schmidt (2010) mentioned that AC measure by prior related knowledge and individual’s skills and R&D activity.

Stocka, et al., (2001); Schmidt, (2010) stated that AC measure by R&D activity via R&D expenditure: R&D intensity (R&D expenditure/total sales) and level of R&D investment, Continue R&D activities, and existence of R&D labs. Many researchers also mentioned that R&D intensity can be as criteria to measure AC (Cohen and Levinthal, 1990; Stocka, et al., 2001; Vega-Jurado, et al., 2008; Escribano, et al., 2009; Schmidt, 2010). Firm that has fully staffed R&D department to capture such as cumulateness can be criteria of measure AC (Veugeler, 1997; Cassiman and Veugelers, 2002). Mowery and Oxley (1995); Keller (1996) mentioned that firm’s human capital employ investment in scientific and technical training and the number of scientist and engineers is criteria to measure AC. Schmidt (2010) also mentioned that organizational structure and human resource management practice could measure capability of AC. Veugeler (1997) stated that the number of doctorates within the R&D department measure AC. Zhu et al. (2006) promoted that formal R&D if plant has formal R&D department in-house, informal R&D if plant has R&D but no formal department in-house, the percentage of workforce with degree, and the percentage of workforce with technician or relevant apprentice qualification are criteria to measure AC.

Zahra and George (2002) stated that knowledge acquisition measure by “prior knowledge”, prior investment”, “intensity”, “speed”, and “direction” new knowledge via “scope of search”, “perceptual schema”, “new connections”, “seed of learning”. Zhu et al. (2006) mentioned that knowledge acquisition measure by “employees of our unit regularly visit other firms”, “the firm collect industry information through informal means”, and “the firm periodically organizes special meetings with customers or third parties”. Employees of our unit regularly visit other firms. Zahra and George (2002) stated that knowledge assimilation measure by “understanding” new knowledge via “interpretation”, “comprehension”, and “learning”. Zhu et al. (2006) stated that knowledge assimilation measure by “quickly recognize shift in our market”, “new opportunities to serve our clients that quickly understood”, and “quickly analyze and interpret changing market demands”. Zahra and George (2002) claimed that knowledge transformation measure by “internalization” and “conversion” new knowledge via “synergy”, “recodification”, and “bisociation”. Zhu et al. (2006) promoted that knowledge transformation measure by “employees’ record and store newly acquired knowledge for future reference”, “share practical experiences by employees”, “meet to discuss consequences of market trends and new product development

periodically”. Zahra and George (2002) described that knowledge exploitation measure by “use” and “implementation” new knowledge via “core competencies” and “harvesting resources”.

traditional determinant of AC, and enterprises enable to utilize new external knowledge, which has R&D intensity then briefed prior knowledge as the determinant of AC. Zahra and George (2002) also in their model described that knowledge source and complementarity experience is antecedent of AC.

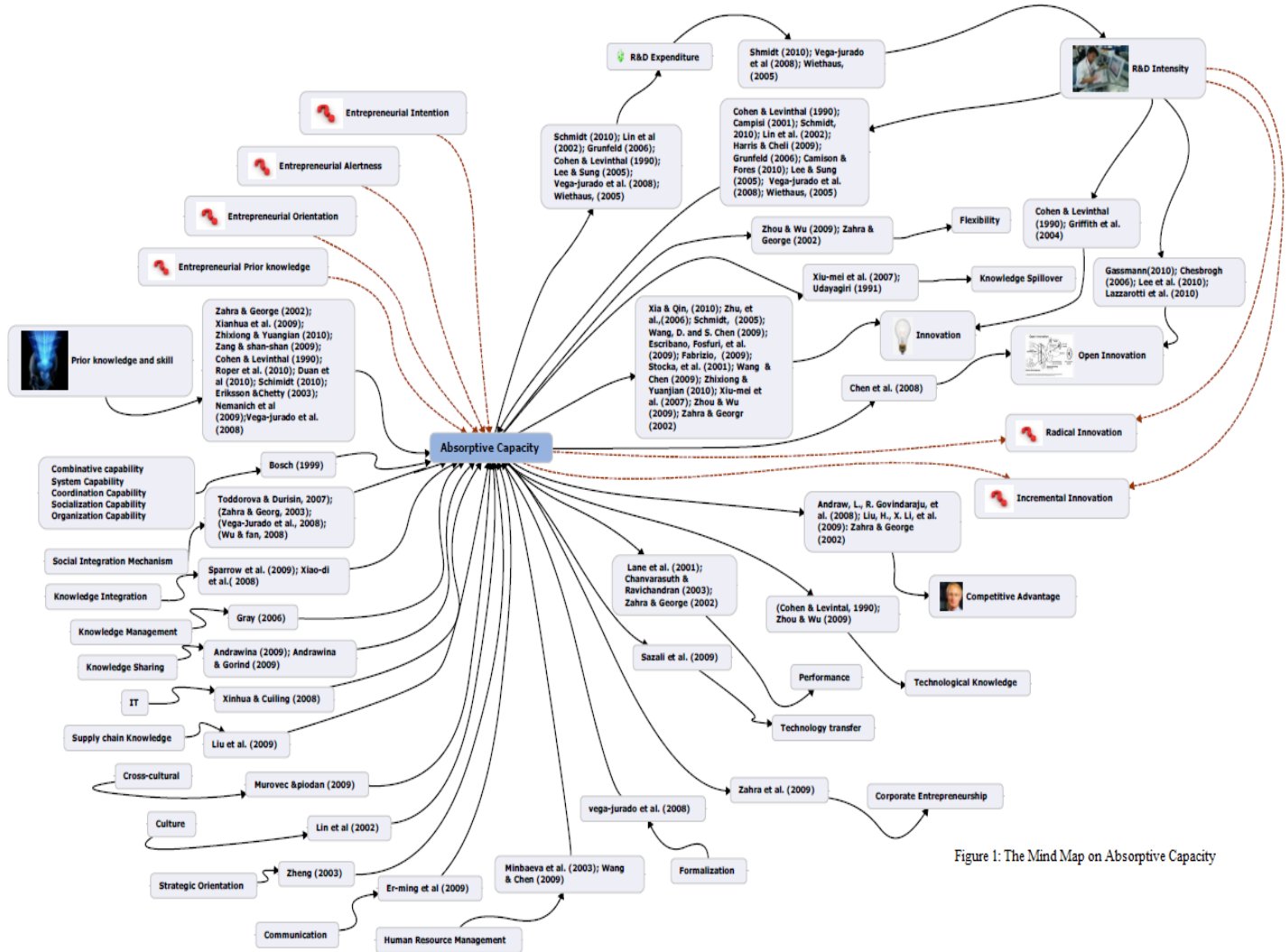


Figure 1: The Mind Map on Absorptive Capacity

Zhu et al. (2006) mentioned that knowledge exploitation measure by “constantly consider how to better exploit knowledge”, “clear division of roles and responsibilities”, and “client complaints can be disposed quickly”. Zhixiong and Yuanjin (2010) stated that individual AC measure by background and previous experience of employees.

2.6 Organizational Antecedents

Many researchers studied about aspects and characteristics, which may influence on capability of AC as organizational antecedents. These antecedents may have positive or negative effects on the process of creation new value. First of all, Cohen and Levinthal (1990) mentioned that R&D is the

Figure 1 shows the mind map for this area and gap in overall view through last research about capability of AC. Table 2 also shows summary of the literature review articles on the past research on AC.

Bosch et al. (1999) divided three combination capabilities as the antecedent of AC, which should be within enterprise. These combination capabilities included; 1) capability of system: this capability refers to procedure policy, which is often used in organization for knowledge integration.

Organization behaviors such as rules, procedure and communication are defined in written documents and they show a certain degree of formality in organization. Bosch et al. (1999) stated

that high level of formalization has negative effect on level of AC because of the decreased flexibility in organization. 2) Capability of coordination: this capability plays the role of improving knowledge absorption among individuals and groups especially in a turbulent environment. Bosch et al. (1999) mentioned that high degree of cross-functional interfaces, participation in decision-making; job rotation and training make richer knowledge absorption and have positive effect of level of AC. 3) Capability of socialization: this capability refers to knowledge of creation through sharing knowledge and ideas by individuals. Socialization increases social integration, which supports capabilities of system and coordination. Bosch et al. (1999) mentioned that this capability found strong capability in organization and make coherent ideas and beliefs so organization has the high degree of knowledge sharing and common language and behavior. They added these advantages have negative effect on the level of AC because enterprise may not be able to absorb new external knowledge. It means although capability of socialization has the high potential for efficiency, but it has the low potential in levels of AC.

Jansen et al. (2005); Bosch (1999) claimed that a composition includes three types of attitudes, which affect the potential of AC and realization of AC in enterprises: 1) capability of coordination, 2) capability of system, and 3) capability of socialization. They also discussed that these compositions help to enterprise to mobilize a variety of resources and development enterprise to integrate function and composition for acquisition, assimilation, transformation and exploitation of new external knowledge. Jansen, Bosch et al. (2005) base of definition of capabilities of AC by Zahra and George (2002), examined about pressures in departments and levels of AC and found that high level of AC need to variety of abilities in enterprise' structure. They argued that enterprise has two types of capabilities; 1) Harmonization in potential AC; its mean coordinate abilities of cross-functional, participation job rotation and decision making. 2) Environment communication in realized AC means abilities to connecting and policy to be approachable. The result of research on the relationships between combination capabilities and dimensions of potential and realized AC shows that; cross-functional and job rotation have positive effect on potential and realized AC, participating in decision-making has positive effect on potential AC and negative effect on realized AC, formalization, routinization, connectedness, and socialization have negative effects on potential AC and positive effect on realized AC.

In 2008, Vega-Jurado et al. suggested a new model of enterprises' AC. In this model, organizational parameters are the antecedents of AC. The least mentioned aspect in the model by Vega-Jurado et al. (2008) is the applicability of relevant external knowledge as a requisite parameter that makes the temperate impact on factors of determinants of enterprise' AC. They also mentioned that parameters are not related to others. According to Vega-Jurado et al. (2008), there are three factors, which determine AC; 1) organizational knowledge includes; sciences, human resource practice and organization's members' skills, and R&D. 2) Formalization pertains to the scope routine activity in enterprise or level of formal function. The morality of formalization is decreasing contact in departments and harmonization in enterprise. Increasing formalization reduces flexibility and individual power to face emergency conditions then went down virtue of creativity and innovation, its mean impact in two aspect on AC. 3) Social integration mechanisms decrease the difficulty of transferring knowledge in enterprise. These mechanisms promote knowledge absorbing by issue sprit via contribution of knowledge, combination of knowledge, interaction among employees, distribution of knowledge and provide experience and skill.

Fabrizio (2009) stated that enterprise with anticipated internal knowledge can anticipate taking advantage from linkage to new science. As a form of innovation, enterprises are able to put human resource practice in AC. For instance, in staffing, education and incentive to draw out and strengthen individuals' knowledge and skill needed (Wang and Chen, 2009). Roper et al. (2009) focused that human capital in AC is a significant factor and it affects innovation. Zhixiong and Yuanjin (2010) distinguished between abilities of employees in structure of potential AC and realized AC this differentiate also include the dimensions of AC. They also mentioned about impact of individuals' knowledge and departments in organization in the speed and process of AC.

2.7 Consequences of Absorptive Capacity

Many research studied about AC and its outcomes. Zahra and George (2002) and Peters and Johnston (2009) mentioned that antecedents of AC lead its process to competitive advantage includes performance, strategic flexibility, and innovation. She and Lin (2006) mentioned to performance as the consequence of AC. Cohen and Levinthal (1990); Stocka, et al. (2001); Zhu et al. (2006); Wang and Chen (2009); Escribano et al. (2009); Fabrizio (2009); Xia and Qin (2010); Schmidt (2010) claimed that AC lead organization to innovation.

2.8 Absorptive Capacity in Cluster

Tan (2006); Hu and Wang (2009) mentioned to attribute of AC in industrial cluster and entrepreneurship's area. Entrepreneur who conducted to information in the cluster be successful than others to innovation and utilization knowledge absorbing. Gathering numbers of entrepreneurs in identical industry and one geographical place defined as the cluster (Tan, 2006; Hu and Wang, 2009). Porter (1998); Tan (2006) introduced conceptual of the cluster as groups of associated and interconnected firms that are linked vertically and/or horizontally through their commonalities and complementariness in products, services, inputs, technologies or outputs activities, transportation, warehouse, and communication. Tan (2006) mentioned that industrials' structure which district in same geographical place has some features as: 1) locally enterprise and culture, 2) industrial locally, and 3) organizational associated.

Technological cluster provides good soil for the growth innovation activity (Zhu, Cai et al. 2006), they also explain by other researchers about capability of clusters as the competitive factor to innovation. Escribano et al. (2009) also argue about

new external knowledge with definition of the cluster that new science absorbs by enterprise via cluster, and its related to; 1) number of enterprise in cluster 2) in same point area 3) same sector in activity 4) same community ties 5) nature of knowledge and 6) level of relevant knowledge. Tan (2006) posited that enterprise in cluster fostering by; 1) knowledge, 2) workers, 3) organizations, and 4) materials, after that mentioned in this condition consequence will be innovation and then competitive advantage.

2.9 Absorptive capacity in Network

Peters and Johnston (2009) designed AC model in the network in relationship with partners. This conceptual adapted by AC model, which have drew in 2002 by Zahra and Georg and ability to identify value by Cohen and Levinthal in 1990, which added another ability as the ability of recognize the value of new external knowledge to this capability. They provided three components as 1) regimes of appropriability, which is kind of external effect on enterprise's ability that shield innovation, 2) social integrations, which assist to construct ability to be connected and common definitions, and 3) power relationship, which is interacting with other organization capabilities such as learning.

Table 2: Summary of the Literature Review Articles on the Past Research on Absorptive Capacity

No.	Researcher (s)	Framework	Sample	Method	Result
1	Cohen & Levinthal (1990)	Definition and Dimension of AC and Conceptualization of R&D	1,719 business units representing 318 firms in 151 lines of Business in the American manufacturing sector	Quantitative	Significant of prior related knowledge. Organization's AC will depend on the absorptive capacities of its individual members. Role of Gatekeeper and Boundary-Spanner. R&D generates new knowledge also contributes to the firm's AC
2	Bosch et al. (1999)	The effect of organizational forms and combinative capabilities on AC	Literature Review	Conceptual	In increasingly turbulent knowledge environment, firms are likely to increase their AC by developing organization forms and combinative capability (system capability, coordination capability, socialization capability)
3	Campisi et al. (2001)	Competition, AC and Market Shares	Literature Review	Conceptual	Links among the firms' R&D investment, the extra-industry R&D activity, and the formation of firms' stocks of technological knowledge
4	Stock (2001)	AC and new product development	The sample included 1507 distinct new products in computer modem manufacturers	Qualitative 595 observations	AC capacity and new product development performance will be positively related.
5	Zahra & Gorge (2002)	Conceptual of AC	Literature Review	Conceptual	AC as a dynamic capability to sustain a competitive advantage. AC has two subsets and four dimension: a) potential AC 1- acquisition 2- assimilation b) realized AC 3- transformation 4- exploitation
6	Jansen et al. (2005)	The effect of organizational antecedents affect potential and realized AC	The general managers of 769 organizational units in 220 branches in European, multi-unit financial services firm	Quantitative	Analysis relationship between three types of combinative capabilities and AC: (1) coordination capabilities, (2) systems capabilities, and (3) socialization capabilities

Table 2: Summary of the Literature Review Articles on the Past Research on Absorptive Capacity

No.	Researcher (s)	Framework	Sample	Method	Result
7	Gray (2005)	The effects of high and low AC on actual growth over time	Among 2,000 UK SMEs	Quantitative	Poor management and lack of ICT skills and knowledge
8	Andrawina, et al. (2008)	The relationships between knowledge sharing capability, AC, and innovation capability	114 Companies (Indonesian ICT society)	Quantitative	Two behaviors difference in nature 1- communication and 2- consulting Knowledge sharing capability defined as the employees' ability to conduct knowledge donating and knowledge collecting on experiences, idea, expertise, and information. AC is the mediating of knowledge sharing capability and innovation capability.
9	Vega-Jurado et al. (2008)	Effect of nature and organizational parameter on AC	84 Spain SMEs	Quantitative	organizational knowledge, formalization and social integration mechanisms may have negative or positive effect on components of AC
10	Chen et al. (2008)	The Determinants of the Growth of AC Based on an Open Innovation Perspective	Literature Review	Conceptual	AC explains how firms can create and capture value from in-sourcing external knowledge. AC and open innovation should be linked to each other.
11	Wu & Wang (2008)	Ac in individual level	Literature Review	Conceptual	Individual level is link between AC and learning
12	Escribano et al. (2009)	Moderating role of AC in turbulence environment	Data from the Spanish national Statistics Institute	Quantitative	Ac as moderator has positive effect on innovation in turbulent knowledge environment
13	Roper et al. (2009)	Ability of R&D to acquire know from deferent source	Data from the Irish Innovation Panel	Quantitative	Workforce skills in graduate and intermediate level also both formal and informal aspect of R&D activity have positive effect on AC and innovation
14	Wang & Chen (2009)	Relationship between human resource practice and innovation performance	154 Chinese firms	Quantitative	Human resource practice positively related to AC
15	Sazali et al. (2009)	The effect of AC as technology recipient characteristics on degree of inter-firm technology transfer	85 firms	Quantitative	AC is positively related to degree of tacit and explicit knowledge in inter-firm technology transfer
16	Fabrizio (2009)	Impact of communication, link and connection with universities scientists	83 biotechnology and pharmaceutical industry firms	Quantitative	More in-house basic research will exhibit superior search for innovation. A greater degree of connectedness to university scientists will exhibit super search for invention.
17	Schmidt (2010)	Firm's ability to exploit knowledge from external partner	4500 firms (European Economic Research)	Quantitative	Student-firm and teacher-firm Determinants of AC by R&D activity, prior knowledge and skills, organization structure and human resource management
18	Duan et al. (2010)	The model of government knowledge management base of AC and measure to enforce AC	Literature Review	Conceptual	Knowledge management of government agencies should base on AC instead learning capability to seek out more appropriate strategy orientation
19	Camison & Fores (2010)	Conceptualization and measurement of AC	2000 Spanish industrial firms with exception of energy sector	Quantitative	All dimensions of AC should be together generating new knowledge
20	Zhixiong and Yuanjian (2010)	Individual and organizational AC	Literature Review	Conceptual	Knowledge AC is the key factor of maintaining continuous innovation. Knowledge AC can be analyzed from the two aspects of individuals and organizations. The knowledge AC of enterprises depends on the knowledge AC of individuals and the mechanism of knowledge exchange among staffs

Peters and Johnston (2009) posited that network' AC has three capabilities; 1) Potential AC: a capability to recognize AC as regular process and activity in the network. 2) Realized AC: a capability

to discover knowledge solution, determine and apply to the network. 3) Relative AC: a capability to acquire knowledge between two enterprises, which have the same attributes in the network.

Peters and Johnston (2009) briefed three specific contingent factors as moderators in the development of AC. 1) social integration mechanism, 2) regimes of appropriability, and 3) power relationships. Social integration mechanisms help build connectedness and shared meanings (Todorova and Durisin, 2007). Regimes of appropriability defined as the institutional and industry dynamics that affect the firm's ability to protect the advantages of (and benefits from) new products or processes (Peters and Johnston, 2009). Power relationships defined to interact with cognitive processes, learning, and capabilities in the organization and so should be considered as a contingent factor (Todorova and Durisin 2007). They posited that power relationships help to explain why only some of the available new knowledge is used by the organization, and why some organizations are better able to exploit external knowledge.

2.10 Entrepreneurial Antecedents

Cohen and Levinthal (1990) discussed the internal mechanism of the firm that has impact on AC. According to them, enterprises cannot buy and quickly apply new external knowledge for innovation. AC should be within the enterprise and its units simultaneously (Cohen and Levinthal 1990). On the other hand, past studies indicated that enterprise antecedents can have a variety of impacts on AC in each dimension or capability (Jansen, Bosch et al. 2005). According to last studies, researchers have treated that AC may be derived from different antecedents which determinant AC (Bosch, 1999; Jansen et al., 2005; Vega-Jurado et al., 2008; Peters and Johnston, 2009). Many scholars mentioned that AC may lead to different and variety outcomes (Fasnacht, 2009; Chesbrough, 2003; Dewar and Dutton, 1986).

Although there are vast literature about influence of organizational antecedents on AC and innovation, but still there is gap and limited insights about AC in perspective of entrepreneurship. In this paper, we will address this gap by assume entrepreneurial antecedents as the aspect which may lead AC, and then the effects of AC on radical, open and incremental innovation.

Enterprises survive and exist because they are innovative (Zahra et al., 2009). They mentioned that enterprises nurture their entrepreneurial activities through knowledge and skills, imagination, creativity, and alertness to opportunities. Entrepreneurs often are motivated to foster entrepreneurial activities as a tool of creating wealth. These entrepreneurial activities allow new companies to develop and enter new market niches. They also enable enterprises to create and introduce new products and employ innovative business models.

Entrepreneurial activities also encourage companies to systematize their operations to ensure efficiency, speed and agility in responding to the shifting market conditions. These activities give enterprises the flexibility that enables them to be ahead of customary rivals and arrest bigger market shares in domestic or international markets (Zahra et al., 2009).

Gundry and Welsch (2001) defined entrepreneurial antecedents as factors that determine entrepreneurial propensity and necessity to entrepreneurship in the market. Zahra et al. (2009) defined entrepreneurial firms should 1) discover, 2) create, 3) define and 4) apply opportunities to survive in the market. Dewar and Dutton (1986) and Popadiuka and Choo (2006) claimed that enterprises that access technological knowledge should have three features: 1) organizational structure, 2) organizational attitudes, 3) knowledge distribution. Goffin and Mitchell (2005) stated that individual's motivation, individual's prior knowledge and skills, enterprise's structure and enterprise's atmosphere play the important role to create innovation. Pertusa-Ortega, et al. (2010) stated that the enterprise's characteristics are path dependence and relativity, which resolve the building cost of AC.

Indeed, each types of innovation need to different levels of external knowledge and technological process (Dewar and Dutton, 1986). Enterprises also need to several innovations to have survival into market and achieve higher income, achieve maximum customer satisfaction, and ensure the effective use of all enterprise's capacities such as open innovation, radical innovation, and incremental innovation (Fasnacht, 2009).

2.10.1 Entrepreneurial Prior Knowledge

Many scholars mentioned the role of prior knowledge and skills as determinant of AC (Cohen and Levinthal, 1990; Zahra and George, 2002; Escribano *et al.*, 2009; Fabrizio, 2009; Vega-Jurado *et al.*, 2008). Mockler and Goeller (1991) defined prior knowledge as work experiences and skills, which lead enterprise to success. In 2000, Shane implied that entrepreneurial knowledge is the source of enterprise to discover and recognize opportunities. Shane described that entrepreneurial prior knowledge and skills are generated through past ventures, investment on trainings and learning of individuals in the enterprise.

According to Cohen and Levinthal (1990) the ability to evaluate and utilize outside knowledge is largely a function of the level of prior related knowledge. Duan *et al.* (2010) mentioned that AC is appropriate in gaining new external knowledge whereby it must have some strong fundamental abilities related to the knowledge structure. These abilities are; 1) the ability to appraise knowledge, 2)

the ability to recognize knowledge, 3) the ability to absorb knowledge, 4) the ability to share knowledge, 5) the ability to use internal knowledge, 6) the ability to convey knowledge, 7) the ability to utilize knowledge, 8) the ability to innovate.

The cumulative nature of knowledge may also be related to another determinant of AC, which is the employees' level of education. The more education and training an employee receives, the higher his or her individual ability to assimilate and use new knowledge (Cohen and Levinthal, 1990).

Vegan-jurado *et al.* (2008) mentioned that organizational knowledge is measured according to the individual's skills, the organizational experiences, and the R&D activities. Lane and Lubatkin (1998) proposed that organizational knowledge is determined by inter-organizational learning. Vega-Jurado *et al.* (2008) stated that level of education of workforce is measured by the number of employees with higher education qualification. Employees' skill can be fairly measured by the amount of employees with higher education qualifications (Schmidt, 2010).

2.10.2 Entrepreneurial Intention

Researchers defined entrepreneurship intention as the perception and attitude in enterprise towards the creation of new values which impact on individual's behaviors (Yun and Yuan-qiong 2010). Entrepreneurship intention is a critical character, which can lead enterprise's process toward its action and behavior (Lee *et al.*, 2011). Without intention, the action is very unlikely. Bird (1988) defined an intention as the tendency of individual to behave in such a way it is desired.

Many researchers examined entrepreneurship intention via two factors, which are first, desirability that means perception of individuals to appeal and start new venture, and it involves intrapersonal and extra personal effects. The second factor is feasibility, which is the degree of the tendency of one's capability to do venture and his or her attitudes towards acting or behaving (Lee *et al.*, 2011).

Lee *et al.* (2011) stated that entrepreneurship intention has two levels in gathering the influence on business and creation. The first level is the individual level, in which in this level, the high innovation orientation of members offers the best condition and the climate to support new technological knowledge. The second level is the organizational level, which promotes the innovative climate that can give great impact on individual factors such as job satisfaction.

Norris *et al.* (2000); Fitzsimmons and Douglas (2011); Lee *et al.* (2011); Koea *et al.* (2012) stated that two characters as the basic elementary in intention behavior as perceived feasibility, and perceived desirability. These characters of

entrepreneurial intention defined as; 1) Perceived feasibility which is "individuals' sense of act" (Lee *et al.*, 2011). Norris *et al.* (2000); Koea *et al.* (2012) defined feasibility as degree to which one feels capable of doing so. 2) Perceived desirability, which is defined as "the tendency to act" (Lee *et al.*, 2011). Norris *et al.* (2000); Koea *et al.* (2012) defined desirability as perceptions of the personal appeal of starting a new business and venture.

Fitzsimmons and Douglas (2011) mentioned that entrepreneurial is in general and not only in perceived feasibility or perceived desirability but also a function of the interaction both factors. Norris *et al.* (2000); Lee *et al.* (2011); Koea *et al.* (2012) claimed that entrepreneurship intention is a phenomenon, which leads enterprise from perceived desirability to perceived feasibility to do process.

Li (2008) posited that entrepreneurial intention is the perspective of entrepreneur toward enterprise goals in creating new value. It is a phenomenon that individuals and organizations respect and regard ventures through organizations' goals. Entrepreneurial intention makes individuals willing to be involved in all enterprise processes and ventures.

Fitzsimmons and Douglas (2011) mentioned that to measure perceived desirability could use individuals' entrepreneurial attitudes, which derived from a conjoint analysis experiment, again following. They stated that perceived desirability also measure with the attitude towards the act. Fitzsimmons and Douglas (2011) stated that perceived feasibility also measure by entrepreneurial self-efficacy.

2.10.3 Entrepreneurial Alertness

Many researchers described that alertness is core of opportunity in entrepreneurship research and it leads entrepreneur to discover and recognize opportunities, and decide the worthy actions to be taken (Kirzner, 1979; Busenitz, 1996; Hou, 2008; Foss and Klein, 2010; Yu, 2001; Tang *et al.*, 2010) to exploit them in business (Busenitz, 1996). They mentioned that concept of alertness plays role in three areas, which are making connections to prior knowledge, searching and scanning for the new knowledge and monitoring the new knowledge. Kirzner *et al.* (1979); Foss and Klein (2010); Yu (2001); Tang *et al.* (2010) mentioned the conceptual of alertness and the awareness in finding the gap and new opportunities for new knowledge. Hou (2008) mentioned the antenna as a feature to enable the entrepreneur to find the gap in business environment. Hou also stated that awareness is the ability to recognize opportunities in market and posited that enterprise's members cannot discover or recognize without being alert to turbulent environment and should be aware of the received business's signals.

Hou (2008) also mentioned that individuals with prior knowledge and skills can create alertness and trigger value to related knowledge. Kirzener (1985) stated that scanning for and appreciating new knowledge are attitudes of entrepreneurial alertness. Kirzener (1979, 1985); Qing and Chen (2009) mentioned that alertness creates the behaviors towards providing future opportunities and previous undiscovered opportunities.

Busenitz (1996) briefed five criteria to measure alertness. They are first, the percentage of hours devoted to thinking about improving business. The second one is the number of magazines read per week. The third is thinking about the new business ideas on vacation. The fourth is having new ideas for new business and finally, the number of trade publication read per month. Hou (2008) briefed working experience in the industry as the criteria to measure alertness.

2.10.4 Entrepreneurial Orientation

Entrepreneurial orientation explains how enterprise disposition undertakes new entry (Lumpkin and Dess, 1996; Hulta *et al.*, 2004; Zheng and Cui, 2007; Okhomina, 2001; Chao-hui, 2010; Xu and Qin, 2010; Yang *et al.*, 2010; Chao-hui, 2010). Enterprise orientation determines the plans, activities and recognizes the opportunities and new venture (Lumpkin and Dess, 1996; Hulta *et al.*, 2004; Zheng and Cui, 2007; Chao-hui, 2010; Hai-qiong, 2010; Zhang and Yang, 2010). The higher level of entrepreneurial orientation has positive effects on enterprise innovation (Hulta *et al.*, 2004).

Researchers defined entrepreneurial orientation is adopting new actions and new ventures to exploit new opportunities in dispositions on dimensions of entrepreneurial orientation (Zhang, 2009; Yang *et al.*, 2010; Okhomina, 2001; Hai-qiong, 2010; Zhang and Yang, 2010; Feng, 2010; Stam and Elfring, 2008). Many scholars mentioned the dimensions of entrepreneurial orientation as innovating, having autonomy, risk taking, being proactive and competing aggressively (Lumpkin and Dess, 1996; Lee and Lim, 2009; Zhang and Yang, 2010).

Innovativeness briefed as “enterprise tendency to engage and support new ideas and process to create products” (Lumpkin and Dess, 1996; Okhomina, 2001; Lee and Lim, 2009; Lee and Lim, 2009; Zhang, and Yang, 2010; Feng, 2010, Soininen, *et al.*, 2012). In other words, “its ability that entrepreneur keen to find out the innovative methods and exploit them in commercial”. Innovativeness also mention “to level of radicalness and represent willingness to depart from current technology process and venture to other venture beyond existing technology” (Lumpkin and Dess,

1996). “Innovativeness captures a bias toward embracing and supporting creativity and experimentation, technological leadership, novelty and R&D in the development of products, services and processes” (Hughes and Morgan, 2007). Lee and Lim (2009) briefed innovativeness as important means, which has, “reflects to pursue new ventures”. They issued that innovativeness represents “a basic willingness to depart from existing technologies or practices and venture beyond the current state of art”.

Risk taking briefed as “feature of entrepreneurship, which frequently happen in three types: willingness take on loan heavily, unknown venture, and committing in large resource” (Lumpkin and Dess, 1996; Hughes and Morgan, 2007; Lee and Lim, 2009; Soininen *et al.*, 2012; Bolton and Lane, 2012) “by seizing opportunities in the market place in the interest of high returns” (Lee and Lim, 2009). Therefore, risk taking mention to “level of willingness of enterprise and managers to takes bold actions” (Lumpkin and Dess, 1996; Lee and Lim, 2009; Zhang and Yang, 2010; Feng, 2010).

Proactiveness briefed as “actions toward opportunity seeking, forward looking to first mover advantages and direction of environment to introduce new product or services ahead of the competitors and acting in anticipation of future demand” (Hughes and Morgan, 2007; Hughes and Morgan, 2007; Lee and Lim, 2009; Feng, 2010; Bolton and Lane, 2012; Soininen *et al.*, 2012). Proactiveness is critical factor of entrepreneurial orientation, which is “action toward new venture through forward looking perspectives” (Lumpkin and Dess, 1996; Zhang and Yang, 2010).

Competitive aggressiveness: briefed as “tendency of enterprise to directly and intensely challenge to access new entry and promote position to compete in market” (Lumpkin and Dess, 1996; Hughes and Morgan, 2007; Lee and Lim, 2009; Zhang and Yang, 2010). Lee and Lim (2009); Soininen *et al.* (2012); Bolton and Lane (2012) defined competitive aggressiveness by Lumpkin and Dess (1996) as “Intensity of a firm’s effort to outperform rivals”.

Autonomy briefed as “an independent action undertaken by entrepreneurial leaders or teams directed at bringing to develop business concepts and visions and carry them through to completion” (Lumpkin and Dess, 1996; Hughes and Morgan, 2007; Lee and Lim, 2009; Lee and Lim, 2009; Zhang and Yang, 2010; Bolton and Lane, 2012).

3. Conclusion

AC is a necessity and undeniable construction in organizational structure, which may lead by variety of antecedents and drive to differences consequences. Although there are vast

literature about influence of organizational antecedents on AC and innovation, but still there is gap and limited insights about AC in perspective of entrepreneurship. Study about the entrepreneurial antecedent could open new perspective to make powerful this capability to access new values. On the other hand, type of innovation also could be as outcome of this process.

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