

## Exploring the Entrepreneurial Orientation of Absorptive Capacity and Its Impact on Radical Innovation

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**Abstract:** Absorptive capacity is dynamic capability that allows the enterprise deal with knowledge from the external environment. This capability enables enterprises to internalize knowledge and innovation to commercial ends. In the past decades, there have been studies about organizational characteristics, which may have positive or negative effects on the capability of absorptive capacity, but insights about the development of absorptive capacity in perspective of entrepreneurship are still limited. This research examined the influence of entrepreneurial orientation on absorptive capacity. Enterprises need to develop innovation for survival in the market and radical innovation has features which to keep enterprise situation in market and competition. The purpose of this research was attempting operationally exploring the influence of entrepreneurial orientation on absorptive capacity. Second, analyze precision and accuracy in capability of absorptive capacity. Third, analyze the mediating effects of absorptive capacity on radical innovation. Fourth, analyze the collaboration of R&D unit within absorptive capacity to develop radical innovation. The findings come from survey questionnaires of 400 managers in auto industrial of Iran. This research approved that enterprise for developing radical innovation need to external knowledge. Also entrepreneurial orientation plays the important role on implements and mechanisms of knowledge absorptive capacity. Next, absorptive capacity is dynamic capability for introduce radical innovation in the market. Finally, the higher level of absorptive capacity and its abilities achieve through positively higher level of entrepreneurial orientation with collaboration higher positively level of R&D activity, which leads enterprise to higher radical innovation.

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**Key words:** Absorptive Capacity; Innovativeness; Risk-Taking; Proactiveness; Radical Innovation; R&D

### 1. Introduction

Knowledge briefed as the core of competitive advantage in enterprise (Chilton and Bloodgood, 2007). In fact, the level of enterprise' knowledge shows how much enterprise enables to apply it and compete in turbulent environment (Chilton and Bloodgood, 2007; Escribano *et al.*, 2009; Salehi, Omar, et al., 2013). Zahra *et al.* (2009) mentioned that "new knowledge could appear through discussions among the managers on the environment, business and customers in terms of AC". New technological knowledge and ideas can acquire through clients or customers, suppliers or consultants (Roper *et al.*, 2009), universities (Svetina and Prodan, 2008; Roper *et al.*, 2009), inter-relationship enterprises, research institute, science parks, commercialization research centers (Svetina and Prodan, 2008), joint ventures (Zahra and George, 2002 Roper *et al.*, 2009), licensing, cooperation contracts, R&D contracts (Zahra and George, 2002), turnkey contracts, reverse engineering, sub-contracts, internet, conference, journals, commercial advertisement, foreign direct investment, and industrial international exhibition. Many researchers posited that AC is necessarily capability to promote internal knowledge through external activity to develop new products (Cohen and

Levinthal, 1990; Zahra and George, 2002; Escribano *et al.*, 2009; Fabrizio, 2009; Schmidt, 2010). Cohen and Levinthal (1990); Zahra and George (2002); Salehi, Omar, et al. (2013). briefed type of learning from environment that promotes enterprise' knowledge to provide innovation. Cohen and Levinthal (1990) defined Absorptive Capacity (AC) as static capability that enterprise assimilate, transform, and exploit new knowledge to commercial ends. After that Zahra and George (2002) briefed first theoretical framework of AC and defined it as dynamic capability which enterprise interprets knowledge through abilities of acquisition, assimilation, transformation, and exploitation.

### 2. Absorptive Capacity

The seminal articles about AC published by Cohen and Levinthal (1990); Zahra and George (2002). They introduced AC as dynamic capability, which leads to innovation by functional of prior knowledge and experiences. This capability enables enterprise to acquire, assimilate, transform, and exploit new external knowledge (Szulanski, 1996; Zahra and George, 2002; Vega-Jurado *et al.*, 2008; Peters and Johnston, 2009; Zhixiong, Yuanjian, 2010 Salehi, Omar, et al., 2013). This subject is used in the field of technology transfer, strategic management, innovation management, and

organizational learning (Salehi, Omar, et al., 2013). Researchers defined AC as “key variable” to develop the new products (Stocka, et al., 2001). In addition, AC, firstly, decrease risk by descend strategic defect, secondly shield stakeholder’s benefits, and thirdly generate riches through innovation (Zahra *et al.*, 2009).

The recognition and identification value of knowledge enables enterprise to acquire knowledge and the absorption new external knowledge enables to assimilate knowledge (Lane and Lubatkin, 1990; Zahra and George, 2002; Xiao and Qin, 2010; Zhou and Wu, 2010; Salehi, Omar, et al., 2013). They defined that the development, refine knowledge, which already absorbed to enable enterprise to transform knowledge in this stage enterprise add and subtract knowledge or change and expand it by previous enterprise’ knowledge and experiences. Finally, enterprise’s knowledge that already acquired, assimilated, and transformed to exploit knowledge to the new technological way (Lane and Lubatkin, 1990; Zahra and George, 2002; Xiao and Qin, 2010; Zhou and Wu, 2010; Salehi, Omar, et al., 2013). All abilities of “AC should implement to gather and if enterprise able to recognize, identify and absorb knowledge but not able to transform or exploit it does not have the capability of AC” (Zahra and George, 2002).

### 3. Entrepreneurial Orientation

Entrepreneurship defined as new entry such as new product or service and new market through new venturing (Lumpkin and Dess, 1996). Entrepreneurial orientation explains how enterprise disposition to undertakes new entry (Lumpkin and Dess, 1996; Hulata *et al.*, 2004; Zheng and Cui, 2007; Okhomina, 2001; Chao-hui, 2010; Xu and Qin, 2010; Yang *et al.*, 2010; Chao-hui, 2010). In other word, entrepreneurial orientation determined plans, activities and recognizes of the entrepreneur to exploit opportunity and new venture (Lumpkin and Dess, 1996; Hulata *et al.*, 2004; Zheng and Cui, 2007; Chao-hui, 2010; Hai-qiong, 2010; Zhang and Yang, 2010). Entrepreneurial orientation defined as behaviors and characteristics such as decision making and practice which lead enterprise to new entry (Lumpkin and Dess, 1996; Stam and Elfring, 2008; Zhang and Yang, 2010). Therefore, entrepreneurial orientation plays role as antecedents of innovation (Hulata *et al.*, 2004; Yang *et al.*, 2010). Many researchers defined entrepreneurial orientation in 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). Entrepreneurial orientation also defined as process of strategy making to entrepreneurial actions and decisions (Lumpkin and Dess, 1996, Bolton and Lane, 2012).

According to last research most of researchers

mentioned to component of entrepreneurial orientation and briefed dimensions of entrepreneurial orientation as innovativeness, risk-taking, proactiveness (Lumpkin and Dess, 1996; Covin and Slevin, 1989; Wililund, 1999; Kreiser et al., 2002; Tarabishy et al., 2005; Marino et al., 2002; Hughes and Morgan, 2007; Miller, 1983; Madhoushi et al., 2011; Hughes and Morgan, 2007; Lee and Lim, 2009; Sojininen et al., 2012; Bolton and Lane, 2012). Innovativeness briefed as enterprise “tendency to engage and support new ideas and to create products (Lumpkin and Dess, 1996; 2001; Lee and Lim, 2009; Zhang, and Yang, 2010; 2010, Sojininen, et al., 2012). In other words, its ability that entrepreneur keen to find out the innovative methods and exploit them in commercial. Innovativeness also mentions 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 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: take on loan heavily, unknown venture, and committing a large portion (Lumpkin and Dess, 1996; Hughes and Morgan, 2007; Lee and Lim, 2009; Sojininen et al., 2012; Bolton and Lane, 2012). 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; Sojininen 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).

### 4. Radical Innovation

Many scholars mentioned that AC may lead to the different outcome (Salehi, Omar, et al., 2013; Fasnacht, 2009; Chesbrough, 2003; Dewar and Dutton, 1986). In this research will be to address this gap by analyzing the effects of AC on radical. Indeed, each type of innovation needs at the different levels of external knowledge and technological process (Dewar

and Dutton, 1986). Many scholars stated that radical innovations could be the key to enterprises opening new markets (Henderson and Clark, 1990; Green, *et al.*, 1995; Liefer *et al.*, 2000). Managers know the significance of radical innovation in a long time (Liefer *et al.*, 2000; Benedetto *et al.*, 2008; Xin *et al.*, 2008, Salehi, Omar, et al., 2013). Radical innovations with technology cause the basic revolution in the market (Popadiuka and Choo, 2006).

Leifer (2000); Salehi, Omar, et al. (2013) described radical innovation according to these features: 1) restructured market, 2) sustained for a long time, 3) current product and sale are transferred, 4) changing relationship between suppliers and customers. He also defined radical innovation as the new technological knowledge which brings new market, and it is different from the existing knowledge and strengthens the position of existing competitors. Heiskanen *et al.* (2007); Xin *et al.* (2008); Varadarajan (2009); Salehi, Omar, et al. (2013) mentioned that radical innovation has higher customer and its benefits in compare with the current product. Heiskanen *et al.* (2007) posited that radical innovation recognized by three features: 1) its autonomy, 2) with systematic and complex effect in enterprise, and 3) its instrumental. Xin *et al.* (2008) defined radical innovation with characters as: 1) high risk, 2) sustain in long time, 3) great opportunity, 4) expand and develop market, 5) competitively dominant in the market, 6) challenge in management, and 7) foot hold in the market.

### 5. R&D Activity

The R&D unit establishes in enterprise; 1) to extend technological knowledge which in environment is not developed, 2) to monitor, evaluate and understand new external knowledge, 3) effort to integration knowledge, 4) to contribute with other enterprises and selling research results (Chesbrough, 2003). Cohen and Levinthal (1989, 1990); Schmidt (2010); Salehi, Omar, et al. (2013). described twofold roles of R&D, its mean in one hand R&D build up new knowledge and in another hand, it expands abilities of enterprise to identification, assimilation and exploitation new knowledge absorbed to adopts and disseminates innovation. "R&D labs also traditionally as the source of radical innovation" and redirect collaborate with operational units (Leifer et al., 2000). Developing radical innovation is not only by R&D, and it depends on risk-taking and enterprise investment (Xin et al., 2008). Generally, the role of R&D is to handle emerging technological knowledge, which has an impact on innovation, but it is not yet ready for commercial ends (Cohen and Levinthal, 1990; Chesbrough, 2003).

### 5. Finding

This research used a sample from the auto industrial of Iran. The unit of analysis was managerial levels in quantitative method research. A total of 440

questionnaires were distributed and returned 400 questionnaires. The 6-point Likert scales has been used in getting responses, whereby respondents can choose among the given options. The options given in the questionnaire are strongly disagree, disagree, somewhat disagree, somewhat agree, agree and strongly agree. Result on multiple regression and linear regression in SPSS examined in order to achieve the objectives of research. In addition before the test in regression model, Cronbach's Alpha for each components and variables group, Exploratory Factor Analysis for each group of variables have done.

The framework of this research is shown in Figure 1.

The multiple regression models are set for test relationship between component of entrepreneurial orientation and abilities of AC, as can be seen in Table 1, there are ties between innovativeness, risk-taking and roactiveness as a dimension of entrepreneurial orientation and abilities of AC. Output table summarize shows the statistical results of the estimated multiple regression model. The coefficient of risk-taking and R&D activity show the ties with abilities of AC. The positive sign on coefficients indicate that higher level of knowledge acquisition, assimilation, transformation, and exploitation knowledge increase with innovativeness, risk-taking, and R&D activity. The negative sign on the proactiveness coefficient indicates that the level of knowledge acquisition and exploitation increase, decrease with this dimension of entrepreneurial orientation.

In second section Pearson Correlation used for test relationship between R&D activities and radical innovation through second role of R&D activity on innovation. There is a significant positive relationship between R&D activity and radical innovation,  $r(400) = .469, P < .05$ . In third section, the relationship between AC and radical innovation tested through Pearson correlation. It revealed a significant positive correlation between AC and radical innovation,  $r(400) = .568, P < .05$ . In last relation based on finding examine the level of capability of AC, which achieved through implication abilities of AC. In this section, the level of influence of knowledge acquisition on knowledge assimilation, knowledge assimilation on knowledge transformation, and knowledge transformation on knowledge exploitation examine to find the level of knowledge AC. The Pearson correlation test revealed a significant positive correlation between acquisition and assimilation,  $r(400) = .664, P < .05$ . In the next relation the Pearson correlation test revealed a significant positive correlation between assimilation and transformation,  $r(400) = .535, P < .05$ . In last relation also the Pearson correlation test revealed a significant positive correlation between transformation and exploitation,  $r(400) = .533, P < .05$ .

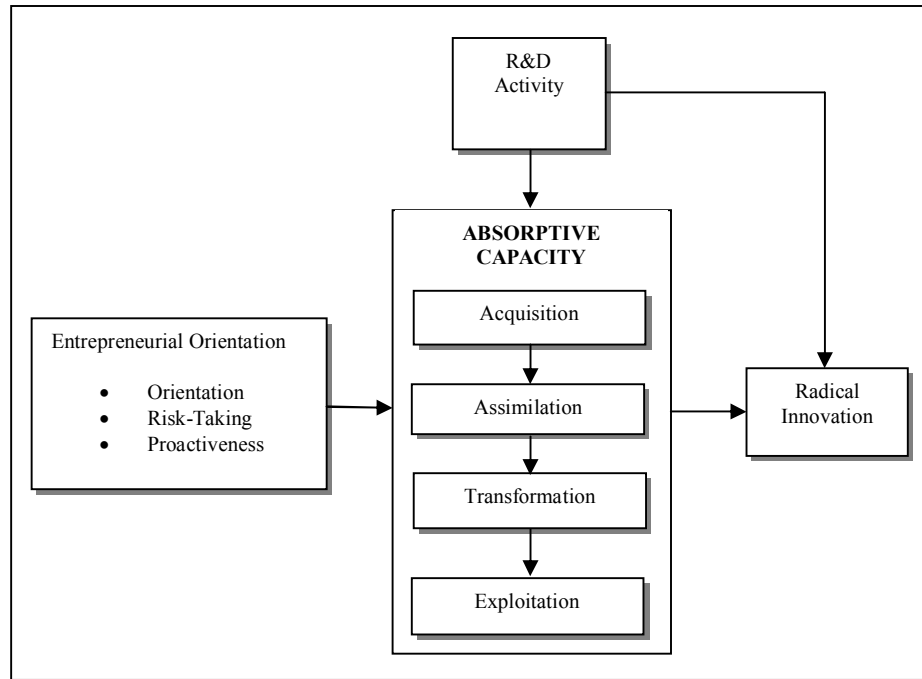


Figure 1. The research framework

Table 1. Multiple Regression Analysis for Dimension of Entrepreneurial Orientation

Variable	Acquisition			Assimilation			Transformation			Exploitation			AC		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
(Constant)	1.414			2.045			-.337			2.558			1.361		
Innovativeness	.108	.035	.133	-	-	-	.281	.036	.298	.141	.033	.204	.149	.023	.227
Risk-Taking	.288	.055	.267	.257	.043	.276	.379	.047	.296	.281	.048	.309	.297	.037	.339
Proactiveness	-.130	.051	-.121	-	-	-	-	-	-	-.288	.044	-.317	-.095	.034	-.110
R&D Activity	.412	.041	.453	.290	.036	.370	.426	.042	.394	.237	.035	.309	.336	.027	.461
$R^2$	.444			.295			.554			.408			.607		
F for change in	78.721			82.938			164.136			68.118			152.648		
Sig (2 tailed)	.000			.000			.000			.000			.000		

Note: (N = 400), P Value < .05.

## 6. Discussion

The purpose of this research was to identify effect of the entrepreneurial orientation on AC and its impact on radical innovation. Enterprises are having found that they must rely on knowledge acquired from the environment to facilitate the development of new products. On the basis, Cohen and Levinthal (1990) mentioned to AC then, Zahra and George (2002) briefed first theoretical framework of AC in conceptual articles. Zahra et al (2009) again in another conceptual article mentioned about the role of AC on enterprises sustain corporate entrepreneurship. Hence, there is not any empirical research about AC in perspective of entrepreneurship and how abilities of AC implement knowledge absorption. Although past research mentioned to R&D, and it impacts on AC but there is not empirical research about the relationship between

R&D and acquisition, assimilation, transformation, and exploitation knowledge. Cohen and Levinthal (1990) and Schmidt (2010) in their studies used AC as a conceptual tool to determine the incentives for R&D investment and R&D expenditure, but they did not measuring these abilities directly. Vega-Jurado et al (2008) in their studies also only measure R&D activity and two aspects of AC as potential (acquisition and assimilation) and realized (transformation and exploitation).

Therefore, this research assessed and examined the links between specific entrepreneurial orientation as feature and factor, which can drive AC. In addition, in this research viewed to radical innovation as a consequence of AC. This research used a sample from the auto industrial of Iran. The unit of analysis was managerial levels. A total of 440 questionnaires were

distributed and returned 400 questionnaires. Result on Pearson correlation, multiple regression in SPSS examined in order to achieve the objectives of study.

The following hypothesis was tested out in this research that a higher level of AC achieved through higher level of entrepreneurial orientation with R&D activity will positively benefit new external knowledge. This hypothesis includes twelve sub-hypothesis, which are about the relationship between entrepreneurial orientation and AC about influence of innovativeness, risk-taking, and proactiveness as a dimension of entrepreneurial orientation with R&D activity on AC and its abilities. The findings show that the relationship between entrepreneurial orientation and AC is significant to note. But the negative sign on the proactiveness coefficient indicates that the level of knowledge acquisition and exploitation increase, decrease with this dimension of entrepreneurial orientation. Also there is not any relationship between proactiveness and assimilation and transformation in contribution of other dimension of entrepreneurial orientation. Therefore, the findings indicate that enterprise's abilities to absorb, digest and apply new technological knowledge are influenced by the entrepreneurial orientation. Hence, base on findings the main hypothesis accepted and indicates that enterprise's capability of AC to identify, absorb, digest, and apply new external knowledge is influenced by this antecedent. Many researchers stated that entrepreneurial orientation has positive effects on organizational learning and its increase enterprise' abilities to absorb and apply business information (Keh et al., 2007; Wang, 2008, Mousa and Wales, 2012). Entrepreneurial orientation can be basis for entrepreneurial processes which in managerial level use to act entrepreneurially (Lee and Lim, 2009). Miller (1983) briefed entrepreneurial firm with this characterizes; undertakes somewhat risky new ventures, the first to come up with proactive and innovation, and innovative in product market. These relationships are significant to note and enhance abilities of AC to absorb new external knowledge also achieved radical innovation. Finding implies that R&D activity and those parts of R&D expenditures that expectations typically on reasonable way lead enterprise to new technological knowledge, or processes of production. The related studies also mentioned that R&D unit establishes in enterprise for: 1) for extend technological knowledge which in environment is not developed, 2) to monitor, evaluate and understand new external knowledge, 3) effort to integration knowledge, 4) to contribute with other enterprises and selling research results (Chesbrough, 2003).

The next hypothesis was tested out to address the next objective of study as a higher level of R&D activity positively influence on radical innovation

through contribution with AC. Finding show that the relationships between abilities of R&D activity are significant to note. Cohen and Levinthal (1989, 1990); Schmidt (2010) described twofold roles of R&D, its mean in one hand R&D build up new knowledge and in another hand, it expands abilities of enterprise to identification, assimilation and exploitation new knowledge absorbed to adopts and disseminates innovation. The R&D lab also traditionally as the sources of radical innovation and redirect collaborates with operational units (Leifer et al., 2000). Developing radical innovation is not only by R&D, and it depends on risk-taking and enterprise investment (Xin et al., 2008). Generally, the role of R&D is to handle emerging technological knowledge, which has an impact on innovation, but it is not yet ready for commercial ends (Cohen and Levinthal, 1990; Chesbrough, 2003).

The following hypothesis was tested out to address the next objective of study as; a higher level of capability of AC achieved through stronger implication of all abilities of absorptive capacity. This hypothesis includes three sub-hypothesis, which are about the relationship between abilities of AC. Findings show that the relationships between abilities of AC are significant to note. It means that ability to assimilation is influenced by the acquisition. Knowledge acquisition has positive effects and enhances knowledge assimilation. Next, ability to transformation is influenced by assimilation. Knowledge assimilation has positive effects and enhances knowledge transformation. In last relation, ability to exploitation is influenced by transformation. Knowledge transformation has positive effects and enhances knowledge transformation. Hence, this hypothesis accepted and indicate that abilities of AC with positive and strong relationship in this process. This research question is important how abilities of AC participate and interact to recognize, absorb, change, and apply new external knowledge. Because in each stage knowledge which acquired must permit to assimilate, transform, and exploit to the new technological way. Knowledge in each step develops and accumulates for future step. Therefore, implement of each subsets are important. Vega-Jurado et al (2008) posited that AC is sum of abilities that cumulative knowledge in character in the sense that is the development in each ability and will permit for more efficient accumulation in the future. They mentioned that this aspect of AC indicates that its development is path or history dependent. Jansen et al (2005); Zahra and George (2002) in their theoretical framework stated that enterprise cannot possibly exploit new external knowledge without first acquire, assimilate, and transform it. They pointed that sometimes the enterprise enables to acquire, assimilate, transform knowledge but is not able to exploit it to the technological way. Therefore, cannot say enterprise has the capability of

AC. Vega-Jurado et al (2008) also mentioned sometimes cannot be immediately applicable external knowledge because there are difficulties to assimilate and transform it, even though the enterprise might recognize that it has value.

The following hypothesis was tested out to address the last hypothesis as; a higher level of mediating role of capability of AC develops enterprise's radical incremental innovation. Finding shows that the relationship between AC and radical innovation is significant to note. As finding indicates the sign on the AC coefficient is positive, therefore, this equation indicates that there is positive relationship between AC with radical innovation, and the higher level of AC can increase and enhance radical innovation. The above-mentioned finding indicates that AC as necessarily capability promotes external knowledge to produce new products. The related studies about radical innovation mentioned that "radical innovation concerns the development of new businesses or product lines based on new ideas or technologies or substantial cost reductions that transform the economics of a business and therefore, require exploration competencies" (Leifer et al., 2000). In the process of radical innovation, enterprise has a concept to feasible product to introduce in the market. It may take 10 years to successfully process because radical innovation has long and difficult process and complex process. Radical innovations can be the key to firms opening new markets (Henderson and Clark, 1990; Green, et al., 1995; Liefer et al., 2000). Managers know the significance of radical innovation in a long time (Liefer et al., 2000; Benedetto et al., 2008; Xin et al., 2008). In fact, the idea of relying on radical innovation leads to an emphasis on domestic production.

## 7. Conclusion

This research has explored the framework of AC and its impact on radical innovation. The is design around the theoretical framework of Zahra and George (2002) but in perspective of entrepreneurship types of innovation. This research mentioned to effect and dimension of AC as enterprise' capability also entrepreneurial orientation as drive path to lead on innovation. The finding indicates that AC is as necessarily capability to promote external knowledge to produce new products. It means there are many factors, which influence on enterprise capability to introduce radical innovation. Also capability of AC alone is not sufficient to digest and apply external knowledge, and it should be derived by entrepreneurial factors. This research also expects higher level of AC and its abilities through higher level of entrepreneurial orientation derived to higher impact on introduce technological knowledge. Therefore, the strength of AC backs to their background and antecedent to successfully enable to

radical innovation. This research also shows that enterprise for developing radical innovation need to external knowledge which to digest and apply it on radical innovation need to improve abilities of AC.

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