The Mediating Role of Absorptive Capacity on Its Relation Between Entrepreneurial Orientation and Technological Innovation Capabilities

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***Abstract* - The present study purposes to examine the mediating role of absorptive capacity in its nexus between entrepreneurial orientation and technological innovation capabilities among industrial SMEs in Kurdistan region of Iraq. To validate the proposed model,self-administered questionnaire wasconducted to gathering data from SMEs owners in Kurdistan region of Iraq, 432 questionnaires returned and used for statistical analysis out of 676 distributed. The outcomes of present research reflect that both of entrepreneurial orientation and absorptive capacity have significant effect on technological innovation capabilities. Furthermore, the outcomes assert that the absorptive capacity has a mediation role in the nexus between entrepreneurial orientation and technological innovation capabilities.**

***Keywords*-absorptive capacity, entrepreneurial orientation, technological innovation capabilities**

I. INTRODUCTION

At a time of globalizedmarkets and production, the ability to innovate has a growing importance to firms' success and is nowadays a core discussionof management thought[1]. Verily, strategic status that enabling firm to embark entrepreneurial project is deemed an essential catalyst to activate innovation capabilities[2], [3].However, scholars shown that the relationship between entrepreneurial orientation (EO) and technological innovation capabilities (TIC) is not inclusive but affected by controlled and uncontrolled factors, such as the availability of related knowledge and resources [4], [5]and the nature of competition[6].

Indeed, Knowledge as an inherent power has been studied extensively[7]–[9]and as potential source to enhance other intangible asset i.e. EO has researched as well[4], [5]. In the meantime, studies[6], [9], [10]proposed that firms with high ability to acquire externally generated knowledge i.e. absorptive capacity (ACAP) tend to outstripfirms facing scarceness in such abilities.As such, the effectiveness of ACAP as a mechanism to enhance EO especially in the context of SMEs remains not highlighted enough and that we try to probe in this research. We argue that ACAP enhance both TIC directly and enhance the influence of EO on TIC indirectly.

In so doing, we contribute to the literature through three aspects. First, we examine and elucidate to what extent the EO and ACAP could influence TIC of SMEs. Wide stream of literature have utilized models investigating SMEs innovation have focused on innovation performance and the consequences of innovation, without considering if such innovations stem from firm's orientation itself or adopted knowledge from outside the firm[11], [12]. Therefore, an analysis of the nexus between EO as an internal catalyst of innovation capabilities and joining with ACAP as source for externally generated knowledge could provide significant insights for SMEs. Second, although the notion that firms can intensify their efforts on the adoption of existing knowledge or generate their own is not entirely new, we discuss it from another corner. Our study stem from the insight that firms can use the externally generated knowledge as a mechanism to enhance their proactivity and willingness toward innovation. Thus, we explore the influence of firms' ability to adopt knowledge (ACAP) on their entrepreneurial attitudes toward developing their TIC. Third, for the innovation literature, it is valuable contribution to placing ACAP within the frame of EO. Thus, they can be advantageous to more development in innovation literature.

This paper is arranged in the followingsections: After this introduction, literature review,research model and detailed hypotheses have been elaborated. Then, we present the methodological groundssupporting our analysis. Thereafter, we submit this paper findingsand implications and finally we discuss the limitations and avenues for future researches.

II. LITERATURE REVIEWAND HYPOTHESES

A. Technological innovation capabilities

Adler and Shenhar[13]identified innovation capabilities through the following dimensions: *"(1) ability to develop new products that meet market needs; (2) ability to apply appropriate process technologies to producing these new products; (3) ability*

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to develop and adopt these new products and process technologies to satisfy future needs; and (4) ability to respond to related technology activities and unexpected activities created by competitors". Firm capabilities to launch an infallible product cover the abilities of the firm to obtain and spread externally generated knowledge and transforming this knowledge into distinct competencies and notions ,and then, employing them by producing and commercializing products that are new and improved[7].

Thus,technological innovation capabilities (TIC) includes: product innovation capability which referred to the sets of interrelated rote that employed to engage a distinct product innovation-related manufacturing methods in different areas, such as new products development and existing product improvement[14]. In addition, process innovation capabilities which refers to manufacturing technologies that used in developing innovation capability and enables firms to select and utilize these technologies strategically[15]to develop novel techniques, processes and production methods and to launch new products. This is based on the premise that process innovation capability stems from the learning process upon which firms can internalize new knowledge to bring about technological change and eventually new products and processes [16]. Such a learning process comprises acquisition, imitation, adaptation, modification and/or the creation of new knowledge bundles to be used within the firm. Consequently, this process leads to potential products and having new technical patterns as those are in fact technological innovations [15].

B. Entrepreneurial orientation

Since Miller and Friesen [17]study, entrepreneurial orientation (EO) has become broadly accepted way of enhancing firm innovation and performance[18], [19]. Entrepreneurial orientation is described as the managerial practices, firms' strategic orientation that encapsulates certain side of entrepreneurship of decision-making patterns andworking manners. In addition, it represents the firm's priority to the identification and exploitation of market opportunities [2], [18], [20]and includes three main dimensions: innovativeness represents firms' inclination to advocate new ideas, newness, and masterly processes, through which firms can leave from prior practice and technology [19], [21]–[23]. Proactiveness refers to expecting and reacting to future needs of customers and market, and thus developing a first-initiative preference compared to rivals [19], [20]. Finally, Risk-taking related to a tendency to devote considerable resources to high-risk projects [18], [20]. It indicates committing resources to projects with ambiguous outcomes. On the whole, it represents the firm's tendency to deviate from the normal path and travel through the unknown [24], [25].

C. Absorptive capacity

External knowledge transfer has been receiving increasing interest among researchers for the past period[26] particularly following the seminal contributors [7], the concept of absorptive capacity (ACAP) has emerged and has been used successfully in several studies investigating knowledge transfer among organizations [5], [10], [27]. ACAP is defined as ''the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends'' [5], [10]. ACAP includes four main dimensions: acquisition, assimilation, transformation, and exploitation of knowledge [7], [10]. In theory, external knowledge transfer stems from the fields of dynamic capability, organizational learning and knowledge management [28]. While the concept calls for the appreciation and acquisition of knowledge from the environment, specifically from acquisitions and other inter-organizational relations, it also highlights the internal processes of learning from prior experience and present actions [7], [28].

III. Model and Hypotheses Development

As depicted in Fig.1 our model illustrateshow entrepreneurial orientation influence the technological innovation capabilities directly and indirectly through the firm's absorptive capacity. There are many reasons could explain why EO should be beneficial for supporting innovation capabilities, and the most prominent one represented in providing underexploited opportunities to commercialise the innovation[22]. Moreover, the relation between innovativeness and innovation has been studied extensively in prior research, e.g., [29]. Huang & Wang[18]in their study that focused on promoting innovation levels in SMEs, haveconsidered innovation as entrepreneurial orientation (EO) outcome. In addition, Proactive firms expend efforts on environment observation and monitoring in an attempt to find new trends and stay ahead of the competition [2], [30] that is dynamically linked to market signal responsiveness[31]. Proactiveness can generate capabilities allowing firms to come up with unique products/new markets far ahead of their rivals and the customer's expectations [32].

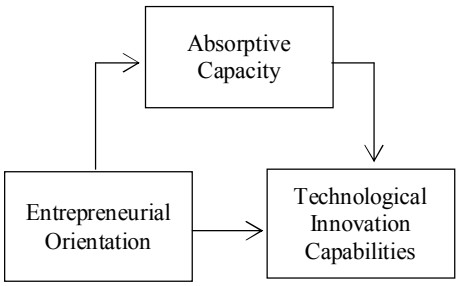


Fig.1 Research Frame work

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Moreover, innovation is primarily risky owing to the potential failure of the new offerings[3], [25], [33], particularly in the case of SMEs [34]. Unless the firm is inclined to face such failure, it will steer clear to refrain of such activities. Innovation generation is linked with steep learning curves referring to the ability of the firm to obtain new operational knowledge[2], [30]. As such

H_1: Entrepreneurial orientation is positively related with technological innovation capabilities.

Scholars proved that EO reflect firms' practicesrather than what they do [19], [24].As such, it could affectknowledgecommercialization and crucialutilization of ACAP through determining the attitudes, threats, and opportunities to enhance knowledge resources [35]. Determining suchopportunitiesshouldleads to create other new knowledgeabout current and potential products and markets' attitudes [8]. In a similar vein, Wales et al.,[35]argue that EO may enable firms increase performance successfully within their ACAP. Thus,

H_2: Entrepreneurial orientation is positively related with absorptive capacity.

Many of the previous studies have supported the notion that absorptive capacity (ACAP) plays a direct role in achieving innovation [27], [29], [36], [37]. Nevertheless, some researchers find non-significant relationship between knowledge acquisition and technological innovation among the industrial firms [38]. However, and according to[39] absorptive capacity (ACAP) can help in fostering technological innovation facilely, and it can also determine the extent to which value can be created[27], by identifying the rapidity, frequency, and volume of innovation[40]. Within this context, researchers, e.g.,[18], [41] reported that innovation depends on the organizational ability to turn both internal and external knowledge into action and outcomes and depends not on the knowledge itself. Hung et al., [12]noted that organizations attempt to merge knowledge by providing facilitative conditions to knowledge sharing between individuals and groups to achieve the highest level of innovation. This leads to the following hypothesis:

H_3: Absorptive capacity is positively related with technological innovation capabilities.

Knowledgeable firms know where to seek new opportunity and how to exploit it [7], but unless they willing to take advantage of these opportunities, the knowledge resources are possibly worthless. [24], this could explains why some firms can acquire and assimilate externally generated knowledge, but not able to exploit it in achieving innovation successfully [39]. Tsai [36] argued that ACAP could soften complicated problems and boosts firms' abilities to determine and respond to new opportunities. In furtherance of these arguments, Sciascia et al., [4] stated that ACAP could enhance the different aspects of EO. Further, entrepreneurial orientation as a firm-level process could be promoted based on firm's capabilities to external knowledge [10], [42]. Thus,

H_4: Absorptive capacitymediate the relationship between entrepreneurial orientation and technological innovation capabilities.

IV. Methodology

A. Data collection and Sample

Self-administered questionnaire was conducted to gathering data from the industrial SMEs owners that working in Kurdistan region provinces in Iraq namely, Erbil, Sulaimany, and Duhok. The targeted population of this study includes eight groups of industrial SMEs namely: machinery and equipment, construction materials, food industry, electric industry, non-metal industry, metal industry, textiles industry, and paper industry. The total number of industrial SMEs is 2607. Stratified sampling has been adopted to be the sampling procedure used in this study given to its accurate, less bias, and the possibility to obtain generalizable results. Based on Krejcie and Morgan [43] and given to population size it is adequate to select a minimum sample of 338 industrial SMEs from the whole research population. In addition, response rate for previous study related to SMEs innovation ranged from 21-67% [21], [25], [41]. Therefore, the sample in current study has been doubled to 676 to get more appropriate sample size in the light of targeted population. Finally, the total number of collected and usable questionnaires was 432 usable questionnaires. Theassessment of non-response bias was conducted by T-test technique where the responses of the early responders were compared to that of their later counterparts [44] according to study variables.

B. Measurement scales

Each investigated construct has been covered in our questionnaire used seven-point Likert scale, where 7 determined for "Strongly agree" ranging to 1 for "Strongly Disagree". Content validity performed by reviewing the related literature extensively in addition to interviewing the experts in the academic field. Technological innovation capabilities measured using thirteen-item scale adapted from Camisón and Villar-López[1], and Tuominen and Hyvönen[14]. Whereas, Entrepreneurial orientation measured via fifteen-item scale adapted from Miller and Friesen, 1982 [22], and Boso et al., [17]. Finally, absorptive capacity scale includes sixteen items adapted from Flatten and Engelen et al., [10].

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V. Statistical Analysis and Results

From the analysis undertaken, EO positively and significantly correlated with TIC ($r = 0.164$, $p < 0.01$) and positively and significantly correlated with ACAP ($r = 0.162$, $p < 0.01$). In addition, ACAP positively and significantly associated with TIC ($r = 0.247$, $p < 0.01$). Such results indicate that the firms with a high level of EO are potentially possess a higher level of TIC and ACAP. In addition possessing a high level of ACAP could attain higher the level of TIC within the firm.

Regression analysis was performed to verify the proposed hypotheses. AS illustrated in Table 1, EO has a positive and significant influence on TIC ($\beta = 0.193$, $t=4.08$, $p < 0.001$) this result give an evidence to support H1. In addition, H2 predicted a positive relationship between EO and ACAP, the result showed to be significant ($\beta = 0.208$, $t=4.40$, $p < 0.001$). ACAP, on the other hand, found positively affects TIC ($\beta = 0.265$, $t=5.69$, $p < 0.001$) and thus H3 is supported. Moreover, the results reflect reducing in significance level of EO and TIC relationship ($\beta=0.144$, $t= 3.06$, $p<0.01$) after the entrance of ACAP in the relation ($\beta=0.235$, $t= 4.98$, $p<0.001$), and that support the assumption in H4 of this study. Furthermore, Sobel test was calculated to estimate the significance of a mediation effect, the result (Sobel test = 2.56, $p = 0.01$) indicates the indirect effect of EO on firms' TIC through ACAP is significantly different from zero. Finally, the results shown that EO could explain just 3.5 %, whereas ACAP could explain 4.1% of TIC variance for industrial SMEs in Kurdistan region of Iraq. As exhibited in Table 2, when both EO and ACAP were included, they could explain 8.6 % of the variance of TIC.

Table11. Results of regression analysis

Variables	**Step 1 (β)**	**Step 2 (β)**	**Step 3 (β)**	**Step 4 (β)**	***t-value***	**Collinearity statistics** Tolerance	VIF
Step 1 EOTIC	0.193***				4.08	1.000	1.000
Step 2 EOACAP		0.208***			4.40	1.000	1.000
Step 3 ACAPTIC			0.265***		5.69	1.000	1.000
Step 4							
EO				0.144**	3.06	0.957	1.045
ACAP				0.235***	4.98	0.957	1.045
TIC							
F	16.68***	19.42***	32.43***	21.24***			
R2	0.037	0.043	0.070	0.090			
Adj.R2	0.035	0.041	0.068	0.086			

**p < 0.01; ***p < 0.001; *n*= 432

VI. Discussion and Implications

This studyconfirms the essential role of entrepreneurial orientation, especially for SMEs that have high levels of absorptive capacity. The first finding and implication deduce that firms with creative, proactive and risk-taking attitudes could enhance their technological innovative capabilities and utilize the externally generated knowledge.This finding givesa significant insight intothe debate in literature regarding the role of firm's entrepreneurialorientationitself and adopted knowledge in enhancing SMEs innovation capabilities. A second finding is that ACAP in significantly related TIC. This could provide insight into the debate as to the effect externally generated knowledge on enhancing innovation capabilities within SMEs that characterised with scarce possessing of required knowledge to innovate, especially in developing country like Kurdistan region of Iraq, and that could explain why they rely on external knowledge i.e. knowledge from their customers, suppliers, and even from large competitors to develop their innovation capabilities.

In spite of the low levels of R^2, still, we find entrepreneurial orientation and absorptive capacity enhance innovation capability. But, the deteriorating economic and political situation cast a shadow on the entrepreneurial attitudes and innovation capabilities of industrial firms in Kurdistan region of Iraq and that could illustrates the reduced role of both entrepreneurial orientation and absorptive capacity in explaining technological innovation capabilities. Finally, firms' ability to absorb and exploit the external knowledge could serve as a mechanism to enhance entrepreneurial attitudes to develop innovation capabilities.That is, the valuable knowledge help SMEs to evaluate their opportunities and determine the most beneficial option, and then reduce the size of uncertainty. In the same vein, the mere existing of knowledge outside firm's boundaries does not mean the ease of acquiring and exploiting this knowledge. Therefore, to achieve competitive advantage SMEs should seek for the appropriate knowledge for their activities to exploit.

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