



An empirical model of university competitiveness and rankings: The effects of entrepreneurial behaviors and dynamic capabilities

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ARTICLE INFO

Article history:

Received 13 October 2021

Received in revised form

21 November 2022

Accepted 30 April 2023

Available online 23 June 2023

Keywords:

Entrepreneurial behaviors

Dynamic capabilities

Competitive advantage

University performance

ABSTRACT

Although competition between universities has become increasingly ferocious in the last decade, the impact of dynamic capabilities and entrepreneurial behaviors, in terms of innovativeness and proactiveness, on university competitiveness and rankings has rarely been investigated. It is hypothesized that entrepreneurial behaviors and dynamic capabilities enhance the competitive advantages of universities, thus enabling them to improve their rankings. Six hypotheses were tested on a sample of 240 universities from 13 countries in East Asia and Southeast Asia. The relevant data were drawn from the Quacquarelli Symonds (QS) World University Rankings and SciVal. The results indicate that entrepreneurial behaviors can exert a significant influence on the dynamic capabilities of a university, including those of sensing market exposure, seizing strategic collaboration opportunities, and reconfiguring knowledge generation. These dynamic capabilities, in turn, strengthen competitive advantages in domains such as reputation, human capital, and knowledge. This study contributes to the literature by integrating entrepreneurial behaviors and dynamic capabilities into a framework for university performance. The results should benefit academic administrators who wish to secure competitive advantages for their institutions and to boost their rankings.

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1. Introduction

In the past decade, global competition among universities has grown in both intensity and dynamism (Musselin, 2018). Thus, all universities strive to react more rapidly and efficiently than their rivals to changes to the fluid environment. Leydesdorff and Etzkowitz (1998) developed the triple-helix model of innovation in order to produce a framework that captures the interactions between three key players, namely universities, the government, and the economy. That interaction fosters economic and social development. Anttonen, Lammi, Mykkänen, and Repo (2018) posited that the industry sphere (helix) highlights business opportunities, that the government sphere focuses on industrial

renewal and economic development, and that the university sphere should emphasize knowledge production and communication in order to promote conceptual consensus. Etzkowitz, Zhou, and Caiazza (2022) extended the model by reference to the notion of “triple-helix twins” in order to emphasize the balance between economic development and sustainability. At universities, knowledge transfer is the process of transmitting, converting, and commercializing basic research with a view to facilitating regional economic development (Yuan, Li, Vlas, & Peng, 2018; O'Reilly et al., 2019). The success of knowledge transfer is strongly correlated to the ability of the university to marshal scarce resources in a dynamic environment (Yuan et al., 2018; Teece, Peteraf, & Leih, 2016).

According to dynamic capability theory, awareness of the competitive situation, the exploitation of potential opportunities, and the reconfiguration of resources in change processes are critical for firms to acquire competitive advantages (CAs) and to improve their performance. Entrepreneurship theory postulates that the entrepreneurial orientation, which is connected to the characteristics of proactiveness, innovativeness, and risk taking, should be related to dynamic capabilities (DCs)—awareness of risk exposure

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Peer review under responsibility of College of Management, National Cheng Kung University.

should be promoted, the escalation of commitment should be accelerated, and more contingency plans should be adopted (McMullen & Kim, 2016; Miron-Spektor & Beenen, 2015). The Covid-19 crisis spurred firms to develop DCs through entrepreneurship. It has been argued that entrepreneurial behaviors (EBs) can enable the exploitation of CAs. Jonathan (2015) indicated that EBs can help catalyze the acquisition of DCs. EB may have a direct impact on the DCs that pertain to sensing changes in the market environment and customer needs, to leveraging potential opportunities and emerging competencies, and to reconfiguring limited resources to manage change (Takahashi et al., 2017). These DCs can enable firms to respond to market changes more rapidly, which is inordinately important for the attainment of CA, especially of the first-mover variety. CAs further benefit firm performance. The foregoing propositions indicate that the influence of dynamic capabilities (DCs) and EB on firm performance has been established in the corporate domain. However, its implications in the university setting have not been explained comprehensively (Balasubramanian, Yang, & Tello, 2020).

Since universities are constantly developing strategies to overcome challenges, they can achieve sustainable CAs (Chukwuemeka & Onuoha, 2018; Takahashi et al., 2017). Universities with strongly EB should seek alignment with the demands of the real world. They should meet external challenges and pressures through entrepreneurial leadership in order to improve DCs and CAs. However, the nature of the influence of EB on DCs and the interactive effect of EB and DC vis-à-vis CAs at the university level remain obscure.

Hitt, Ireland, and Hoskisson (2017) argued that reputational advantages (measured by reputation as perceived by academics and employers), human-capital advantages (measured by the ratio of faculty to students), and knowledge advantages (measured by the volume of academic research per faculty) can impact university performance and rankings. CA can help a university to improve its position in the industry (Rose, Rendell, McDaniel, Aberle, & Kliegel, 2010). Universities can engage in specific management operations in order to solidify their leadership in a given sector (Wu & Nguyen, 2019), which can produce additional CAs. However, few studies have investigated the interface between EB, DCs, CAs, and university rankings. Previous studies on the nature of the relationship between EB and DC differ. Adherents to one school of thought argue that EB has a direct and positive effect on performance (Boling, Pieper, & Covin, 2016; Kraus, Rigtering, Hughes, & Hosman, 2011). Others have suggested that the effect in question is indirect and operates through DCs (Jiao, Wei, & Cui, 2010). Others still have proceeded from the notion that the interaction effects of EB and DC are critical for performance (Kim, 2016). Evidently, more empirical work is needed.

As Chen and Miller (2015) noted, if managers fail to identify the strategies that are necessary to seize the initiative, their organizations, that is, universities, may forfeit their advantages in the market, which may precipitate a decline in overall performance, that is, a fall in university league tables. These concerns are of the utmost importance, and this study attempts to address the corresponding research gaps. Specifically, the objectives of the study are (1) to investigate the inter-relationship between entrepreneurial orientation (EO), DC, and CA, (2) to identify the direct and indirect influence of EO and DC on CA and university rankings, (3) to verify the impact of CA on university rankings, and (4) to examine the interactive effect of EO and DC on CA and university rankings.

2. Literature review and hypotheses development

According to UNESCO, Higher Education Institutions (HEIs), such as universities, colleges, and institutes of technology, focus on education, research, and training, which are important for the

international reputation of a country as well as for its wealth and economic development. In the last two decades, Asian universities have increasingly engaged in global competition by seeking improvements to their rankings (Sukoco, Lestari, Susanto, Nasution, & Usman, 2021). The Quacquarelli Symonds (QS) World University Ranking reported that the number of Asian HEIs in the top 1000 reached 264 in 2020. This development has encouraged the leaders of many Asian universities to develop their HEIs through entrepreneurial leadership by using DCs to obtain a CA. However, this issue has rarely been studied before in the setting of the HEI industry.

2.1. The role of entrepreneurial behaviors at Higher Education Institutions

HEIs contribute substantially to the reputation, wealth, and economic development of nations (Pucciarelli & Kaplan, 2016). In dynamic environments, HEIs change their values by focusing on internationalization rather than on massification (Musselin, 2018). Thus, both governments and university leaders must promote the global reputation of HEIs by achieving higher rankings (Sukoco et al., 2021). Recent studies have called on leaders to use entrepreneurial leadership and EO, which would entail aggression, proactiveness, risk taking, and innovativeness in the pursuit of opportunities and competitive edges (Covin & Slevin, 1989; Johnson & Schaltegger, 2020; Kilduff, 2019; Miller, 1983).

Anderson, Kreiser, Kuratko, Hornsby, and Eshima (2015) defined that the EO has two dimensions: managerial attitude toward risk (risk taking) and EB (innovativeness and proactiveness). Since managerial attitudes toward risk are regarded as a matter for the university leadership, they should be measured through surveys or interviews. Due to the limitations of secondary-data approaches, this study focuses on the EBs that encompass innovativeness and proactiveness. Managerial attitudes toward risk are beyond the scope of the study.

Many countries have increased their investment in research and development (R&D) at HEIs dramatically in order to promote innovation, to boost university rankings, and to enhance national economic development (Xu, Hsu, Meen, & Zhu, 2020). Thus, HEIs with a higher level of EB tend to initiate and implement more innovative and proactive strategies, which can result in the acquisition of CAs and in superior performance, that is, in higher rankings (Kim, 2016). Furthermore, EB is required from HEIs that wish to link knowledge to industry and commerce in order to improve economic development, job creation, and incomes (Hammond, 2019; Biasi, Deming, & Moser, 2021; Wahab et al., 2019). In light of the foregoing considerations, we formulated two hypotheses.

H1. Entrepreneurial behaviors are positively related to the competitive advantages of a university.

H2. Entrepreneurial behaviors are positively related to the ranking of a university.

2.2. Relationship between entrepreneurial behavior and dynamic capabilities

Recently, scholars have argued that DCs are critical for the acquisition of CA and for improving university rankings in dynamic competitive environments (Drnevich & Kriauciunas, 2011; Kim, 2016). Thus, the combined effect of EB and DCs may exert a powerful influence on university performance (Açıkdilli & Ayhan, 2013; Lee & Chu, 2011). One common contention is that EB should operate in tandem with DC so as to enable universities to be aware of the competitive situation, to seize business opportunities, to reconfigure resources, to manage change, and to become market

leaders (Miron-Spektor & Beenen, 2015; Miron-Spektor, Ingram, Keller, Smith, & Lewis, 2018). Entrepreneurs are required to develop capabilities through an iterative process of trial and error, strategic speculation, benchmarking, and training. Teece (2007) asserted that detecting, seizing, and understanding entrepreneurial opportunities involves recognizing business trends, allocating resources, and reorganizing business structures and systems in order to fulfill the needs of consumers. DCs can be understood as key means of leveraging EB and of exploiting and exploring entrepreneurial opportunities. Thus, EB, when coupled with DCs, results in more pronounced CAs and superior business performance (Covin & Miller, 2013).

DCs in the university setting have been defined from different perspectives. Among others, market exposure can be measured by the frequency with which researchers or their publications are covered in the media (Leonardi, 2014). The seizure of opportunities is typically operationalized by reference to strategic collaborations, which are counted (Teece, 2007). Reconfiguration is operationalized as knowledge generation, which is measured by the number of publications in high-impact journals that a university generates (Teece, 2017). Universities with higher DCs should occupy higher rankings (Peteraf, Di Stefano, & Verona, 2013; Takahashi et al., 2017). If EB can facilitate the detection and exploitation of entrepreneurial opportunities and the reconfiguration of resources in line with changes to the competitive environment, then university performance should improve (Esmer & Faruk, 2017). The following hypothesis emerges.

H3. Entrepreneurial behaviors are positively related to the dynamic capabilities of a university in terms of market exposure, strategic collaboration, and knowledge generation.

2.3. The role of dynamic capabilities at Higher Education Institutions

DCs are regarded as one of the most important determinants of CA and firm performance (Eisenhardt & Martin, 2000). Teece et al.'s (1997, 2007) theory of DCs purports to explain how firms can attain CAs in highly fluid environments. Firms that focus on DCs constantly integrate, renew, and recreate their resources, and they are capable of reconfiguring, reconstructing, and upgrading their core capabilities, which boosts their CAs. Cacciolatti and Lee (2016) contended that DCs, in particular the ability to detect and exploit entrepreneurial opportunities and to reconfigure limited tangible and intangible resources, can create value by fulfilling customer needs in rapidly changing environments. High-performing firms must recognize customer needs and respond to them in a timely manner while also reacting to the actions of competitors in order to maintain their leading positions, to create value for customers, and to retain their CAs (Knight & Liesch, 2016).

Strong DCs should also enable universities to acquire CAs (Chukwuemeka & Onuoha, 2018; Banmairuoy et al., 2022). Universities with strong DCs can integrate, combine, and recombine resources in a dynamic, interactive, and customer-oriented process (Morgan et al., 2012). Accordingly, we formulated the following hypothesis.

H4. The dynamic capabilities of a university, in terms of market exposure, strategic collaboration, and knowledge generation, are positively related to its competitive advantages.

2.4. The relationships between competitive advantage and university performance

The resource-based view posits that a CA can help a company to establish a unique position by developing new product and service

offerings that create more value, thus improving its performance (Rose et al., 2010; Wu & Nguyen, 2019). Universities may leverage these advantages to generate novel ideas. Those novel ideas may entail publications, collaborations with industry, research commercialization, and student training, which can augment performance (Markman, Russo, Lumpkin, Jennings, & Mair, 2016; To, Kilduff, Ordoñez, & Schweitzer, 2018). In other words, superior reputation, the effective allocation of human resources, and improved knowledge generation and commercialization can produce durable gains in performance. Therefore, we propose the following hypothesis.

H5. Competitive advantage is positively related to university performance.

2.5. The impact of the interactive effect of entrepreneurial behavior and dynamic capabilities on university performance

Although EB and DCs have been shown to exert a significant and positive impact on university performance, their interactive effect has never been investigated (Kim, 2016). Scholars have argued that DCs develop through EB. Covin and Miller (2013) further contended that EB should be coupled with DCs to enhance firm performance. Covin and Lumpkin (2011) suggested that DCs should be used to link EB to opportunity exploitation and firm performance. Teece (2007) asserted that detecting, seizing, and reconfiguring entrepreneurial opportunities should involve intensive entrepreneurial activities. Kim (2016) found that both EB and DC have a direct positive effect on firm performance and, furthermore, that combining them can yield a synergetic advantage. Specifically, if the DCs are more acute, the influence of EB on firm performance is significantly strengthened. Although previous studies of the moderating effect of DCs and EB on firm performance have been verified, their findings have never been transposed to the university setting. This study is an attempt to fill this research gap. Accordingly, the following hypothesis was developed.

H6. The interactive effect of entrepreneurial behavior and dynamic capabilities on university performance is positive.

3. Methodology

3.1. Research model

Drawing on the review of the literature and our hypotheses, we developed a comprehensive research framework for university performance. Fig. 1 displays it in graphical form.

3.2. Sample and data collection

Over the past few years, global HEIs have become increasingly Asianized (Kim, 2016). Alive to this tendency, we selected our sample from 13 countries across the East Asia region, namely Brunei, China, Hong Kong, Indonesia, Japan, Macau, Malaysia, the Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam. Our study only includes HEIs that feature in the QS World University Rankings 2021. We limited our analysis to 2021 because the availability of secondary data prior to that year is limited. For example, the scores for HEIs that are ranked above 500th position cannot be extracted. In total, we retrieved data on 240 HEIs from the database. In 2021, those HEIs accounted for approximately 68.6% of the market, in terms of student numbers. Therefore, the sample is substantially representative of the higher education sector in Asia. In order to mitigate the deficiencies of the sample, we also retrieved secondary data from the supplementary database SciVal, from annual reports, and from the websites of HEIs (Sukoco, 2016).

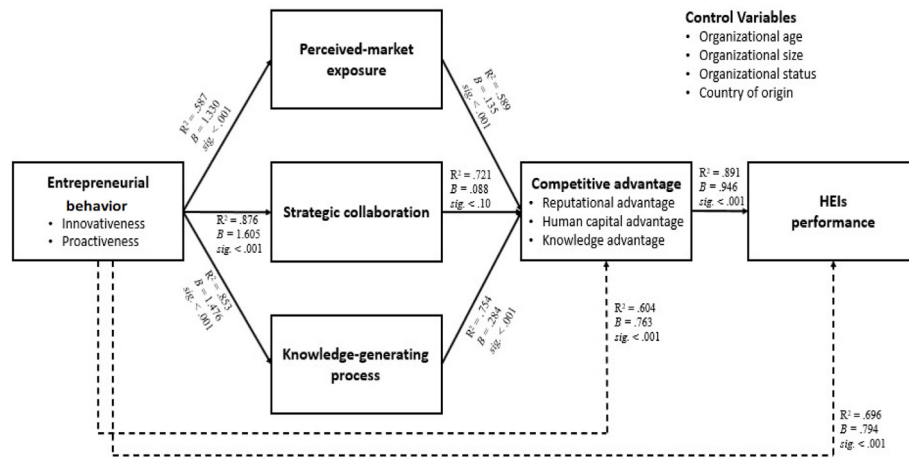


Fig. 1. Research framework of the study.

3.3. Measurement

We applied log data transformation in order to prevent data skewness and to reduce data variability. We also applied normalization to ensure statistical fitness, focusing on the variables “innovativeness,” “proactiveness,” “perceived market exposure,” “strategic collaboration,” and “knowledge-generating process” (Hair, Black, Babin, & Anderson, 2019).

$$F(x) = \log_{10}(x)$$

In addition, in order to minimize predictive error, we computed the mean scores for all of the constructs (Hair et al., 2019). The data were retrieved from the QS World University Rankings and SciVal, which are well-known databases that are used at HEIs worldwide.

3.3.1. Entrepreneurial behaviors

EBs are operationalized through innovativeness and proactiveness (Anderson et al., 2015). We formalized innovativeness by using the number of publications that had originated from a given HEI, were cited in patents, and were subsequently used to develop products or services. We used patents as an index of innovation at HEIs because they capture macroeconomic growth (Frietsch, Neuhäusler, Jung, & Van Looy, 2014). We measured proactiveness by using the number of subject areas in which the academics from a given HEI had published papers, which is indicative of a forward-looking approach to the exploitation of opportunities, a desire to produce high-impact knowledge, and responsiveness to future needs (Covin & Wales, 2019). The data were collected from the SciVal database.

3.3.2. Perceived market exposure

Perceived market exposure was measured by the frequency with which researchers or publications from a given HEI had been covered in the media, be it internationally, regionally, nationally, or locally (Leonardi, 2014). The data were collected from the SciVal database.

3.3.3. Strategic collaboration

We measured strategic collaboration by using the number of collaborations between an HEI and key stakeholders (from academia and industry) that purport to generate or commercialize knowledge (Chadee, Sharma, & Roxas, 2017). That number indicates the ability of an HEI to seize and leverage resources and to

extract value from opportunities (Teece, 2007). Once more, the data were collected from the SciVal database.

3.3.4. Knowledge-generating process

We measured the variable “knowledge-generating process” by using the number of publications by academics at a given HEI that had been published in top-tier journals and cited frequently. That number is indicative of the ability of an HEI to reconfigure, integrate, and transform know-how into specific tangible and intangible assets (Teece, 2007). The data were collected from the SciVal database.

3.3.5. Competitive advantage

In measuring the construct of CA at HEIs, we followed Hitt, Ireland, and Hoskisson (2017). Thus, reputational advantage captures the perceived quality of the academics at a university and the manner in which businesses treat an HEI. Human-resource advantages are captured by the number of faculty members and students (both domestic and international). Finally, knowledge advantages are measured by the impact of the scientific work that the academics at an HEI have published. The data were collected from the QS World University Rankings database.

3.3.6. HEI performance

According to Bowers and Prato (2019), university rankings can be deployed fruitfully to measure the performance of HEIs. Our paper follows their approach. Despite the ongoing debate about rankings and the criticisms that they have attracted, they affect the performance of universities (Nadia, Sukoco, Susanto, Sridadi, & Nasution, 2020). Therefore, we operationalized HEI by reference to the QS World University Rankings (Hazelkorn, 2015).

3.3.7. Control variables

To avoid confounding effects and to enhance internal validity, we employed four binary variables as controls. We used the commitment of an HEI, in terms of resources and organizational attributes (e.g., age, size, and status), because the larger and more mature an HEI, be it public or private, the longer it is likely to have been in receipt of funding and to have accessed certain types of infrastructure, which is likely to have improved its reputation (Mao, Liu, Zhang, & Deng, 2016). We also considered the country in which an HEI operates because HEIs from the same country often encounter similar issues and tend to compete with foreign HEIs (Sharapov & Ross, 2019).

4. Results

4.1. Data characteristics

We investigated 240 HEIs in 2021. The country that accounts for the highest number of institutions in the sample is China (58 HEIs, 24.17%). It is followed by Japan (48), South Korea (39), Taiwan (25), Malaysia (22), Indonesia (16), and Thailand (10). Hong Kong, the Philippines, Vietnam, Singapore, Brunei, and Macau are represented by between two and seven HEIs. The number of public HEIs (176, 73.33%) is higher than that of private ones (64, 26.67%).

4.2. Hypothesis testing

Table 2 presents the intercorrelation matrix of the variables, and Table 3 displays the regression results (see Table 1). We tested several models. M1 and M2 predict perceived market exposure, M3 and M4 predict strategic collaboration, M5 and M6 predict knowledge-generating processes, M7, M8, M9, M10, and M11 predict CA, and M12, M13, and M14 predict HEI performance.

H₁ posits that EB is positively related to the CAs of a university. The correlation coefficient for CA is positive and significant ($p < 0.001$). H₂ posits that EB is positively related to rankings. The coefficient for EB is indicative of a positive and significant effect on HEI performance ($p < 0.001$). H₃ posits that EB is positively related to the DCs of a university in terms of market exposure.

strategic collaboration, and knowledge generation. As is evident from Table 3, the impact of EB on market exposure is positive and significant ($p < 0.001$). The same is true of its effect on strategic collaboration and knowledge-generating processes ($p < 0.001$). Therefore, H₃ is supported. H₄ postulates that the DCs of a university, in terms of market exposure, strategic collaboration, and knowledge generation, are related positively to its CAs. The correlation coefficient for market exposure and CA is positive and significant ($p < 0.001$). The same is true of strategic collaboration and CA (M10: $p < 0.001$; M11: $p < 0.05$) and of knowledge generation and CA ($p < 0.001$). Thus, H₄ is supported. H₅ states that CA is positively related to university performance. The coefficient of the correlation between CA and HEI performance is positive and significant ($p < 0.001$). H₆ hypothesizes that the impact of the interactive effect of EB and DCs on university performance is positive. Table 3 shows that the moderating effects of the three constituent elements of DCs on the influence of EB on CAs are significant ($\beta = 0.190$, $p < 0.001$ for market exposure; $\beta = 0.297$, $p < 0.001$ for strategic collaboration; $\beta = 0.323$, $p < 0.001$ for resource reconfiguration). Similarly, the moderating effects of the three factors on the influence of EB on university performance are significant ($\beta = 0.110$, $p < 0.001$ for

market exposure; $\beta = 0.306$, $p < 0.001$ for strategic collaboration; $\beta = 0.337$, $p < 0.001$ for resource reconfiguration). Fig. 2, Fig. 3, and Fig. 4 display the slopes of the regression models.

4.3. Discussion

University performance is important for national economic development, innovation, and internationalization (Musselin, 2018). However, the influences of EB and DCs on the CAs of universities and their performance have seldom been explored. This study is an attempt to plug these gaps in the literature. The results in Section 4.3 can be interpreted in several ways. First, EB has a significant and direct effect on CA. Its effect is also indirect, manifesting in the detection and exploitation of business opportunities and the reconfiguration of resources. Thus, the constituent elements of DCs operate as partial mediators of the influence of EB and CA. These results are in line with those presented by Kilduff (2019), Xu et al. (2020), and Kim (2016), who showed that DCs must be linked to EB for entrepreneurial opportunities to be exploited effectively. Specifically, EB can exert a strong influence on CAs if entrepreneurial activities can generate higher market exposure, more strategic collaboration, and the more intensive reconfiguration of knowledge generation, all of which augment the CAs of universities (Peteraf et al., 2013; Takahashi et al., 2017).

Second, EB has a significant direct effect on university performance. It also exercises an indirect influence on performance through CAs. Thus, CAs seem to serve as a partial mediator of the influence of EB on university performance. These results accord with those obtained by To et al. (2018) and Markman et al. (2016). Thus, both EB and CA contribute significantly to performance in university league tables. At the same time, universities with more pronounced EB, with its characteristics of aggressiveness, proactiveness, and innovativeness, are in a superior position to secure CAs, which is essential for attaining higher rankings (Biasi et al., 2021; Hammond, 2019; Kilduff, 2019).

Third, the study explores the interactive effect of EB and DC. That effect has a significant influence on university performance. This result is in line with those of other studies that do not focus on rankings. For instance, Covin and Miller (2013) argued that EB and CD operate in tandem to strengthen business performance. Teece (2007) asserted that DCs should involve intensive entrepreneurial activity. Kim (2016) showed that the combination of EB and DCs can create a synergetic CA. These studies circle on the interaction effect between EB and DCs in industry. This study confirms the applicability of their central findings to the performance of universities. Table 4 contains a summary of the empirical results from the testing of the hypotheses.

Table 1
Characteristics of the sample.

Country	Number	TOP 100	TOP 100–500	TOP 501–1000	TOP 1001+	Public HEIs	Private HEIs
Brunei	2	0	2	0	0	2	0
China	58	6	20	27	5	56	2
Hong Kong	7	5	1	1	0	7	0
Indonesia	16	0	4	3	9	13	3
Japan	48	5	11	23	9	36	12
Macau	2	0	1	1	0	1	1
Malaysia	22	1	7	10	4	13	9
Philippines	4	0	1	2	1	1	3
Singapore	3	2	0	1	0	3	0
South Korea	39	6	10	14	9	15	24
Thailand	10	0	2	6	2	10	0
Taiwan	25	1	9	4	11	16	9
Vietnam	4	0	0	2	2	3	1
Total	240	26	68	94	52	176	64

Table 2
Correlation matrix.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Organizational age													
Young (10–25 years old)	1												
Established (26–50 years old)	.236	1											
Mature (51–100 years old)	–.441	–.554	1										
Historic (>100 years old)	–.134	–.169	–.315	1									
Organizational size													
Size M (≥5000 students)	.239	–.005	–.105	–.115	1								
Size L (≥12,000 students)	–.163	.045	.069	.016	–.534	1							
Size XL (>30,000 students)	–.112	–.076	.088	.135	–.333	–.511	1						
Organizational status	–.100	–.030	.123	–.047	.011	–.155	.186	1					
Country of origin													
Brunei	–.040	.168	.093	–.028	–.054	–.083	–.052	.055	1				
Indonesia	–.070	–.026	.062	–.024	–.158	.060	.122	.048	–.024	1			
Malaysia	.376	.033	–.236	–.098	.043	.032	–.146	–.102	–.029	–.085	1		
Philippines	–.056	–.071	–.067	.305	–.002	–.052	.079	–.142	–.012	–.035	–.041	1	
Singapore	.054	.117	–.114	–.035	.019	–.026	.024	.068	–.010	–.030	–.036	–.015	1
Thailand	–.090	–.014	.080	.009	–.123	.021	.126	.126	–.019	–.056	–.066	–.027	–.023
China	–.032	–.007	.030	–.003	–.266	–.100	.454	.296	–.052	–.151	–.179	–.073	–.064
Hong Kong	–.075	.141	–.127	.034	.067	–.007	–.098	.105	–.016	–.046	–.055	–.023	–.020
Macau	.086	.059	–.093	–.028	.155	–.083	–.052	–.048	–.008	–.024	–.029	–.012	–.010
South Korea	–.067	.029	.094	–.096	–.002	.192	–.249	–.347	–.040	–.118	–.140	–.057	–.050
Taiwan	.039	.106	–.074	–.106	.235	–.007	–.192	–.072	–.031	–.091	–.108	–.044	–.038
Japan	–.103	–.248	.200	.177	.205	–.054	–.161	–.019	–.046	–.134	–.159	–.065	–.056
Entrepreneurial behavior	–.137	–.088	.144	.094	–.166	.029	.221	.173	–.135	–.343	–.225	–.162	.103
Perceived market exposure	–.220	–.031	.069	.224	–.297	.100	.242	.166	–.054	–.211	–.067	.117	.187
Strategic collaboration	–.188	–.095	.148	.158	–.205	.034	.238	.170	–.104	–.395	–.239	–.107	.120
Knowledge-generating process	–.092	–.009	.044	.080	–.309	.015	.369	.251	–.068	–.299	–.097	–.116	.100
Competitive advantage	–.095	–.019	.000	.143	–.081	.021	.017	.193	.037	–.289	.025	–.092	.203
HEI performance	–.186	–.038	.058	.180	–.121	.012	.062	.211	.082	–.164	–.017	–.046	.129
Variables	14	15	16	17	18	19	20	21	22	23	24	25	26
Organizational age													
Young (10–25 years old)													
Established (26–50 years old)													
Mature (51–100 years old)													
Historic (>100 years old)													
Organizational size													
Size M (≥5000 students)													
Size L (≥12,000 students)													
Size XL (>30,000 students)													
Organizational status													
Country of origin													
Brunei													
Indonesia													
Malaysia													
Philippines													
Singapore													
Thailand	1												
China	–.118	1											
Hong Kong	–.036	–.098	1										
Macau	–.019	–.052	–.016	1									
South Korea	–.092	–.249	–.076	–.040	1								
Taiwan	–.071	–.192	–.059	–.031	–.150	1							
Japan	–.104	–.282	–.087	–.046	–.220	–.170	1						
Entrepreneurial behavior	–.125	.332	.084	.050	.117	–.043	.051	1					
Perceived market exposure	–.126	.285	.216	–.019	–.059	–.217	.002	.621	1				
Strategic collaboration	–.139	.361	.037	–.011	.118	–.143	.145	.910	.628	1			
Knowledge-generating process	–.030	.501	.128	.038	–.007	–.142	–.195	.845	.610	.841	1		
Competitive advantage	–.137	.125	.296	.064	.038	–.047	–.032	.709	.649	.677	.691	1	
HEIs performance	–.077	.108	.232	.028	.028	–.090	–.015	.647	.672	.639	.636	.925	1

5. Conclusions and suggestions

5.1. Conclusions

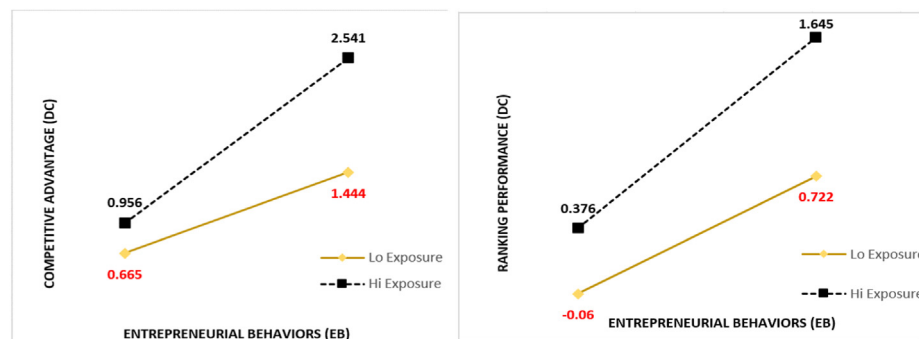
The main purpose of this study was to evaluate the influence of EB and DCs on the competitiveness and ranking of 240 universities from 13 countries in East Asia and Southeast Asia. The research model (Fig. 1) was developed so as to integrate factors that are relevant to the testing of the six research hypotheses.

Several conclusions can be drawn from the results. First, EB has a

significant influence on DCs, CAs, and rankings. EB also has a significant indirect effect on rankings through DCs and CAs. Entrepreneurial leadership is particularly important for the performance of university managers. Universities must improve their infrastructures and retain qualified faculty and staff so that they can increase their exposure to competitive markets, harness the benefits of strategic collaboration, and reconfigure resources. In this way, they can ensure the high quality of teaching, research, and community services, which all boost performance (Takahashi et al., 2017). In addition, EB is also critical for universities that wish to

Table 3
Regression results.

Variables	Perceived market exposure		Strategic collaboration		Knowledge-generating process		Competitive advantage				HEI performance			
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
<i>Control Variables</i>														
Organizational age														
Young (10–25 years old)	-.073	-.133	-.020	-.106	.056	-.031	-.180	-.202	-.150	-.157	-.188	-.286	-.202	-.107
Established (26–50 years old)	.016	-.024	-.013	-.071	.026	-.033	-.141	-.129	-.140	-.128	-.143	-.186	-.129	-.046
Mature (51–100 years old)	.114	.009	.054	-.096	.097	-.056	-.093	.010	-.071	-.074	-.093	-.139	.010	-.044
Historic (>100 years old)	-.164	.073	.119	-.012	.119	-.014	.063	.180	.064	.036	.031	.051	.189	-.009
Organizational size														
Size M (≥ 5000 students)	-.022	-.055	.009	-.039	.011	-.037	-.263	-.229	-.213	-.224	-.226	-.275	-.229	-.014
Size L ($\geq 12,000$ students)	.318	.128	.299	.026	.323	.046	-.360	-.138	-.362	-.458	-.480	-.407	-.138	-.047
Size XL (>30,000 students)	.385	.100	.466	.057	.496	.081	-.425	-.047	-.319	-.498	-.529	-.451	-.047	-.024
Organizational status	.131	.032	.173	.031	.183	.039	.073	.221	.128	.0598	.048	.081	.221	.011
Geographic (country dummies)	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
<i>Main effect</i>														
Entrepreneurial behavior		.553***								.706***	.448***	.439***		
Perceived market exposure										.595***	.244***			
Strategic collaboration											.400***			
Knowledge-generating process														
Competitive advantage														.988***
<i>Interaction effects</i>														
EB x PME											.190***			.110***
EB x SC											.297***			.306***
EB x KGP											.323***			.337***
R^2	.430	.587	.551	.876	.519	.853	.696	.289	.573	.695	.715	.604	.289	.891
R^2	.158	.158	.325	.325	.334	.312	.284	.121	.020	.020	.315	.315	.602	.602
F	8.255	14.779	13.413	73.077	11.834	60.250	23.741	4.453	13.944	22.424	23.510	15.829	4.453	84.919
Durbin-Watson	1.919	1.919	1.855	1.855	1.675	1.675	1.403	1.319	1.319	1.319	1.319	1.129	1.314	1.314
p -value	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Method	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter	Enter
HEI performance	-.186	-.038	.058	.180	-.121	.012	.062							

Note: *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$.**Fig. 2.** Interaction of entrepreneurial behavior and perceived market exposure.

develop their DCs, including those of sensing environmental change, seizing potential market opportunities, and reconfiguring the available resources to manage change and improve rankings. Thus, EB merits more attention. Third, the interactive effect of EB and DCs on university performance is significant. It is important that university leaders understand the synergistic effect of EB and DC and that they recruit the most talented faculty members and teams so as to draw on the strongest dynamic competencies and the most advanced capabilities. If EB fails to promote DCs, the opportunities that those synergistic effects generate are left unexploited.

5.2. Academic implications

Scholars have long striven to contextualize the framework of entrepreneurial and competitive behavior (Kilduff, 2019) at firms

and in industrial settings. This paper is one of the few studies that investigate the independent and the interactive effects of EB and DC on CA and university rankings. The results have several implications for academia. First, the study presented an integrative framework that links EB, DC, CA, and university performance. All hypotheses were tested empirically, and it was confirmed that university performance should be synchronized with the theoretical concepts of EB, DC, and CA. The integrative framework should be highly beneficial for those who are interested in the impact of those concepts on the competitiveness and performance of universities.

Second, given the importance of acquiring DCs, especially in dynamic market environments, the importance of entrepreneurial leadership should not be neglected. The influence of entrepreneurial mindsets, EB, and entrepreneurial leadership has been studied extensively (Lauritzen & Karafyllia, 2019). However, the

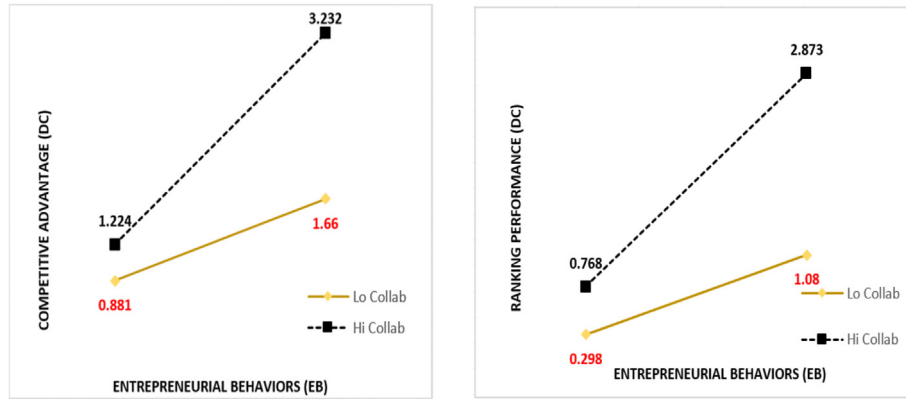


Fig. 3. Interaction of entrepreneurial orientation and strategic collaboration.

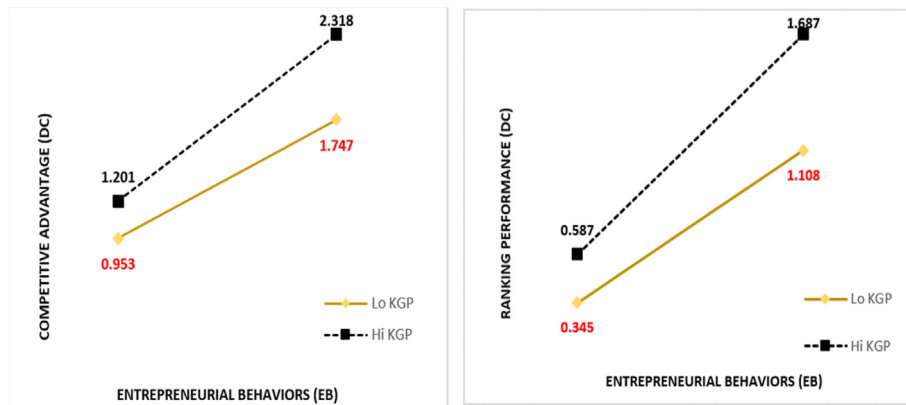


Fig. 4. Interaction of entrepreneurial orientation and knowledge-generating process.

Table 4
Summary of tests of hypotheses.

Relationship	Hypothesis	Assessment
H ₁ Entrepreneurial behavior → competitive advantages	Entrepreneurial behaviors are positively related to the competitive advantages of a university.	Supported $R^2 = 0.696$ $\beta = 0.779$ $p < 0.001$
H ₂ Entrepreneurial behavior → university ranking	Entrepreneurial behaviors are positively related to the ranking of a university.	Supported $R^2 = 0.604$ $\beta = 0.782$ $p < 0.001$
H ₃ Entrepreneurial behavior → Dynamic capabilities (a) Market exposure (b) Strategic collaboration (c) Knowledge generation	Hypothesis H3: Entrepreneurial behaviors are positively related to the dynamic capabilities of a university in terms of (a) market exposure, (b) strategic collaboration, and (c) knowledge generation.	Positive and Significant (a) $R^2 = 0.604$ $\beta = 0.782$ $p < 0.001$ (b) $R^2 = 0.876$ $\beta = 0.795$ $p < 0.001$ (c) $R^2 = 0.853$ $\beta = 0.805$ $p < 0.001$
H ₄ Dynamic capabilities (a) Market exposure (b) Strategic collaboration (c) Knowledge generation → competitive advantages	The dynamic capabilities of a university, in terms of (a) market exposure, (b) strategic collaboration, and (c) knowledge generation, are positively related to its competitive advantages.	Positive and Significant (a) $R^2 = 0.573$ $\beta = 0.706$ $p < 0.001$ (b) $R^2 = 0.695$ $\beta = 0.595$ $p < 0.001$ (c) $R^2 = 0.715$ $\beta = 0.400$ $p < 0.001$
H ₅ Competitive advantage → university performance (UP)	Competitive advantage is positively related to university performance.	Supported $R^2 = 0.891$ $\beta = 0.988$ $p < 0.001$
H ₆ Entrepreneurial behavior (EB) x dynamic capabilities (DC) (a) Market exposure (b) Strategic orientation (c) Knowledge generation → university performance (UP)	The interactive effect of entrepreneurial behaviors and dynamic capabilities on university performance is positive.	Positive and Significant (a) ExDC(a) → UP $\beta = 0.110$ $p < 0.001$ (b) ExDC(b) → UP $\beta = 0.306$ $p < 0.001$ (c) ExDC(c) → UP $\beta = 0.337$ $p < 0.001$

direct effect of entrepreneurial leadership on university performance and its indirect effect on DCs have not benefitted from much

scholarly scrutiny. Thus, more theoretical work is necessary to acquire further insights on EB (Kim, 2016).

Third, the study highlighted the interaction between EB and DCs and its impact on university performance. Entrepreneurial leadership has attracted considerable attention, and its effectiveness in the business sector has long been proven. It was confirmed that EB can improve university performance. However, how entrepreneurial leadership can inspire and motivate workers to achieve the objectives of the institution through proactiveness, innovativeness, risk optimization, and the exploitation of entrepreneurial opportunities, thus securing a leading market position, remains a critical issue for universities and for society; more research is needed.

5.3. Managerial implications

Previous studies have treated the quality of universities as a critical determinant of economic development and social mobility (Musselin, 2018). Therefore, the results of this study may have several practical implications. First, a world-class university can attract the most talented students and provide them with the best possible training. These individuals can then develop state-of-the-art technology and up-to-date management systems to improve the lives of the citizenry and the environments that they inhabit (Wu et al. 2018). The results of R&D at universities are expected to drive national economic development and transformation. Therefore, governments and stakeholders should become more familiar with techniques such as entrepreneurial leadership, the leadership mindset, and EB, which they can employ to improve the performance of universities.

Second, the interactive effect of EB and DCs should receive more attention. The results suggest that combining EB with low DCs yields inferior performance. Thus, focusing exclusively on EB without attending to the competitive environment, entrepreneurial opportunities, and the exigencies of resources reconfiguration would hinder attempts to manage change and secure leading positions in university rankings. University leaders should be capable of inspiring and motivating faculty, staff, and students and of equipping them with entrepreneurial mindsets and EBs. They must also recruit the most talented individuals and train them so that they can develop the most advanced dynamic skills and capabilities. It is important that university leaders understand the synergy between EB and DCs and that they learn to leverage it optimally.

Finally, university performance should be assessed by reference to CAs, EB, and their interaction with DCs. The CAs that result from reputational gains, improvements in human capital, and knowledge acquisition can enable universities to improve their performance.

5.4. Limitations and future research

The results of this study are interesting, and they have important implications. This said, several limitations must be noted. Those limitations may guide future research. First, this study only investigated 240 universities by using the QS World University Rankings and SciVal, which are both secondary databases. The universities in question are all located in East Asia and Southeast Asia and provide tuition to 68.6% of the students in those regions. The representativeness of the sample may require further investigation. The research can be expanded by using different university rankings, such as the Academic Ranking of World Universities (ARWU), the Times High Education World University Ranking (THE), and the SCImago Institution Ranking in order to examine the convergent validity of the results. Second, we drew only on data from 2021 due to the scarcity of observations. Future studies can extend the scope of the secondary data set or develop longitudinal analyses in order to explore changes. Third, differences in government policies and the availability of financial resources mean that

the extent of strategic academic collaboration may vary across disciplines. Citations and the number of outputs may also differ across subject areas or functions. Future research can focus on the differences between subject areas. Fourth, we considered innovativeness and proactiveness only as dimensions of EB. Future research could account for other dimensions, such as risk taking, in order to arrive at additional insights. Lastly, we only collected secondary data on universities from Asian countries; in the future, universities in North America and Europe should also be examined.

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