

The role of entrepreneurial orientation in the development of an integrative process towards entrepreneurship performance in entrepreneurial university: A case study of Qassim university

Abdulaziz Abdulmohsen Alfalih^{a*} and Wided Mohamed Rigmoun^a

^aBusiness Administration, CBE – Qassim University, Saudi Arabia

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ABSTRACT

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Entrepreneurial universities can be considered a new topic that needs greater attention. Many researchers believe that universities can and must have a more important cultural and economic impact. This study seeks to develop and analyze entrepreneurial universities profile using entrepreneurial orientations in order to define an integrative process for entrepreneurial universities. This involves identifying dimensions, mechanisms, and steps for entrepreneurial universities as well as establishing a strategy and plans for universities such as Qassim University or the College of Business and Economics (CBE). To achieve this objective, this study adopted a quantitative approach based on a questionnaire. Data was collected from 210 respondents who were practitioners and academics to discover the effect of the influential factors and entrepreneurial university orientation on the entrepreneurship and innovativeness indexes. The collected data was analyzed using AMOS 24- SEM with a moderating effect. The findings revealed that CBE, in line with strategic planning and the importance of entrepreneurship in Vision 2030, tended towards developing an entrepreneurial orientation and integrated some good practices for the integrative process for entrepreneurial universities (IPEU). The main contribution of this paper was the identification of a path diagram and adequate practices for achieving entrepreneurial university standards. Overall, the findings explicate the importance of this step in terms of cultural, economic, and social impacts. If the findings of this study are tenaciously implemented, this may help Qassim University move towards a higher level of excellence and competitiveness based on entrepreneurship actions. Entrepreneurial university orientation seems to be important for the development of this process. In other words, to become entrepreneurial we must, in the first step, integrate this new approach to determine how to use resources and factors.

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1. Introduction

As noted by Taucean *et al.* (2018), modern higher education institutions are concerned with social and economic needs and try to respond to these as far as possible. In this view, “changes are needed to ensure that they are adapted to the task of creating entrepreneurial thinking, stimulating business creation and exploiting ideas in society”. This can be considered, at this level of analysis, the key to university survival. In 2015, Foss and Gibson demonstrated that universities must adopt an entrepreneurial turn in order to face challenges and force the transition from a simple generator of knowledge (education mission) and innovation (research) to a modern and dynamic university that continuously interacts with its environment to facilitate economic and social growth. In the literature, many researchers have tried to explain how this phenomenon should be developed based on models and processes (Sporn, 2001; O’Shea *et al.*, 2005, 2008). Others insist on its importance to

* Corresponding author. Tel: +966555123660
E-mail address: aziz-al-falch@hotmail.com (A. A. Alfalih)

university survival (Kirby, 2002), but the majority of studies, in spite of their many different conceptions, agree that new and modern universities must develop partnerships, collaboration, new institutional configurations, relationships and interactions between universities, industry, and society (Inzelt, 2004; Leydesdorff & Meyer, 2003). For the development of an entrepreneurial university, many approaches have been selected. There is a process approach that functions according to a systematic framework (Gustomo & Ghina, 2017), an input/output process (Salamzadeh *et al.*, 2011), and a factorial approach in which environments and factors are different (Zhou, 2008). However, to the best of the author's knowledge, no report on an integrative and operational model for the development of an entrepreneurial university is available. This paper focuses on Saudi Arabia due to the enormous progress of this country in reference to its Vision 2030. It aims to identify an integrative process for the entrepreneurial university, especially in regard to the current lack of a robust theoretical framework for understanding this phenomenon (Guerrero *et al.*, 2006) in general, and specifically in the Arabic world.

The main problem of this research is to identify the 'one best way' that universities can adopt to become an entrepreneurial university, because despite its importance, there is still a lack of knowledge on the best ways to develop and implement new programmes (Daxner and Kailer, 2009). This paper seeks to establish an integrative process that can help academics create an entrepreneurial university. The findings of this study will help all universities in developing countries in general, and Qassim University in particular, to adopt an adequate path to success and transition to an entrepreneurial university. This study contributes to the literature by addressing four important issues, which include understanding the entrepreneurial university phenomenon, measuring and considering the entrepreneurial orientation of a university to understand the probability of its entrepreneurial transition, and defining the steps to be followed for its success. This paper first gives a brief overview of the concept of an entrepreneurial university, considering its concept, assumptions, compositions, factors and models. Then, all theoretical findings are integrated to define an integrative model. The adopted methodology is then described in detail. The last part of this research is devoted to the study results and implications. A critical pathway is presented at the end of this research with factors that facilitate the comprehension and validity of that pathway. A list of good practices for entrepreneurial universities is also provided. The paper ends with a conclusion that gives a brief summary and a critique of the findings.

2. Literature Review

This section provides a theoretical grounding in the different concepts used in the construction of the research model. A large and growing body of literature has investigated the definitions, processes, variables, dimensions, factors, elements, models and entrepreneurial orientations of universities. It has generally been argued that entrepreneurial university can be considered a new orientation for universities (Todorovic *et al.*, 2011) based on the importance of a new mutual relationship between universities and industry (Arvanitis *et al.*, 2008) as well as the exchange of knowledge and technology behind university boundaries (Messeni, 2011). Clark (1998) considered that *"an entrepreneurial university, on its own, seeks to innovate in how it goes to business. It seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future. Entrepreneurial universities seek to become 'stand-up' universities that are significant actors in their own terms"*. In the same field, Subotzky (1999) argued that the university – business partnership is the most important factor. Moreover, Leydesdorff and Etzkowitz (2003) suggested that this kind of university needs a new structure that allows teachers and students to be able to take the initiative and approach ventures in different ways; intellectual, commercial, and conjoint. Kibry (2005) associated this concept with a new culture inside universities that can enhance innovation, creating new ideas and promoting teamwork to response to challenges. This research adopts the definition given by Ropke (1998), as it is exhaustive in detail and is more inclusive than the alternatives. According to Ropke, the entrepreneurial university needs three things: the university, which becomes an entrepreneurial organization able to create added value for society; students, teachers, or employees who act as entrepreneurs; and coordination between the university and society based on an entrepreneurial pattern. Numerous studies have attempted to explain the main axis of such a university. Table 1 below is a synthesis of some viewpoints on this concept that can help define standards for an entrepreneurial university.

Table 1
Definitions of the entrepreneurial university

Main attribute	Main objective	Reference
Attitude	Opens new possibilities for students as well as faculty members	Sperrer <i>et al.</i> (2016)
Commitment to entrepreneurship programmes	To develop programmes and courses in order to develop entrepreneurial knowledge	O'Shea <i>et al.</i> (2007)
Social systems	Interactive system for entire universities and their internal departments, research centres, faculties and schools.	Clark (1998)
New culture	Enhance innovation, creating new ideas and working in teams to respond to challenges	Kibry (2005)
"A result of a complex process"	"institutional forces both shape and are shaped by organizational and individual actions"	Gibson and Foss (2017)
Three key stakeholder categories with close relationships	Collaboration between university, industry and government	Etzkowitz (2008)

However, this kind of university must produce new knowledge and disseminate it to industry and society (Krabel & Muller, 2009). Several studies that have investigated entrepreneurial university have revealed the existence of two closely-related concepts; academic entrepreneurship and the entrepreneurial. According to the literature, although they are different, it is

possible to argue that these concepts are interdependent. David and Foss (2017) reported that a university tends to become entrepreneurial by adopting entrepreneurial education or academic entrepreneurship. A dynamic approach to this phenomenon as a process, in line with the objective of this study, which would allow these concepts to be joined and could be considered stage for entrepreneurial university development. Alexander *et al.* (2015) considered entrepreneurial education a tool or component within an entrepreneurial university that is required to build entrepreneurial competencies that are added to the university's teaching mission for all stakeholders (Altmann & Ebersberger, 2013; Gibb & Hannon 2006). In this view, two important actors can contribute to an entrepreneurial university: the academic entrepreneur, who ensures that the activities that take place are related to entrepreneurial practices\education; and entrepreneurial academics, who participate in activities that link the university with organizations and industry. This approach insists on the necessity of developing entrepreneurial skills within courses and workshops during the education process (Lambert, 2003; Vught, 1999; Clark, 1998).

Academic entrepreneurship is similar to the concept of entrepreneurial universities, but based on the literature review, can be considered as only a primary step for an entrepreneurial university that focuses on the exchange between a university and its community through the commercialization of knowledge and research findings (Lambert, 2003; Vught, 1999; Clark, 1998) or opportunities for technology transfers (Mowery *et al.*, 2002). In the same field, Gustomo and Ghina (2017) argued that the development of the entrepreneurial university is based on a series of entrepreneurial processes inside the university. Regarding *The integrative process of the entrepreneurial university*, at this stage of research, it is important to operationalize this approach in order to provide a roadmap that will trace step by step an appropriate 'road' or approach to change from a traditional university to an entrepreneurial university, named here as an Integrative Process for an Entrepreneurial University (IPEU). The general idea of this process is supported by the continuous change that affects the functions, structure, processes, abilities and responsibility areas of universities, which are the result of broader pressures such as socio-political and socio-cultural changes (Tekin *et al.*, 2017). In the same way, the importance of entrepreneurship and its positive effects are identified and discussed in the beginning of this section. It is concluded here that the engagement in or adoption of entrepreneurship by universities is regulated by antecedents that stimulate this process of change, and that this concept has been adopted by universities in different ways across the globe. The general idea of IPEU is represented in Fig. 1.

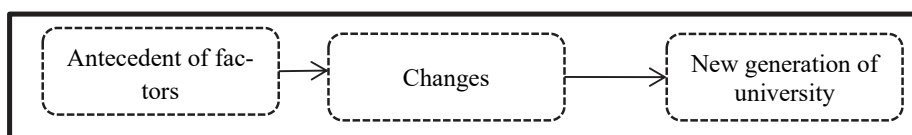


Fig. 1. The integrative process of the entrepreneurial university

Based on this, IPEU is supported by universities as a radical process of change that needs an adequate process to manage it, especially if we remember that radical change is difficult to engage in and requires an exhaustive and specific approach to manage. The specific objective of this study is to identify guidelines for universities to facilitate the emergence of an entrepreneurial university that is more useful in responding to social and economic changes based on knowledge, which seems to be key to the development of an entrepreneurial university. It is necessary to move away from the simple production of knowledge without any special goal to a process able to stimulate the diffusion of knowledge with an ultimate objective: entrepreneurial activities. In other words, we have to move from a static university to a dynamic organization that interacts with industry and society to satisfy specified needs based on a generative process of knowledge for a specific situation (Guerrero and Urbano, 2010). According to Yelkikalan *et al.* (2010), the first step for a university to develop an entrepreneurial profile is to measure the level of entrepreneurship at the beginning of the process. Subsequent steps in its development depend on a process and the creation of roadmaps to achieve the desired level of entrepreneurship, considered here as a strategic objective. As a strategic plan, the integrative process of the EU must follow five principal steps

Step 1. Analyse the actual position or situation in order to determine the strategic objective, which here is the development of a successful EU.

Step 2. Determine the existing resources that can help to achieve the objective. Here, factors defined as antecedents must be analysed in order to identify strengths and weaknesses.

Step 3. Define actions and plans for each challenge based on the actual situation.

Step 4. Define a plan based on the priority level of each challenge identified.

Step 5. Measure the degree of success based on EU standards.

In order to integrate these steps and provide an integrative model, we must first review previous models to define how the study model is different and is expected to add value to this field.

Entrepreneurial university: definitions and determinants

In order to identify the construct of entrepreneurial university, we have to review the models and factors adopted for this new university approach. Our objective was to select main variables related to our research objective, which was to build an integrative process for EU based on factors and determinants.

The entrepreneurial university model can be represented as a process that is started by the introduction of new services that generates new characteristics and functions for the university that enhance its social, regional, and economic environment (Odabasi, 2006, as cited in Tiken *et al.*, 2017). Jarohnovich and Avotins (2013) considered that entrepreneurial university as a “new knowledge producer” and “a disseminating institution” in an entrepreneurial context in which universities, industry, and society must interact. It can be a promoter of entrepreneurship, a developer of techniques, an administrator of assets, a strategic partnership, and a competitive developer (Antonic & Hisrich, 2001). To stimulate economic growth, a university can enhance the productivity of knowledge, produce quality research, and select students who can be active and productive, but the most important idea here is that the needs of growth and society will be the basis for every action (Kibry, 2005; Audretsch, 2007). So, the entrepreneurial university can and must interact with society and industry. There are many roles and actions adopted by this study to realize this concept, but it can be concluded that the entrepreneurial university is an integrative and exhaustive model in which these elements must coexist and must exchange knowledge for the development of an entrepreneurial orientation. The model developed by Jarohnovich and Avotins (2013) is clear and multidimensional, making it the base of the approach adopted here. In this model, the university is represented by missions; education, university, and technology knowledge transfer. Education is related to knowledge creation, especially entrepreneurial knowledge. This first mission encompasses academic entrepreneurship, which was defined at the beginning of this research. The second mission consists of research efforts oriented towards entrepreneurship to develop scientific knowledge. The last mission adopts a Technology Transfer Office (TTO) in order to share knowledge with firms, industry, and society. This model seems to be important as it illustrates components and services according to which entrepreneurial university can exist. However, the principal objective here is to identify a way of developing entrepreneurial universities, measuring their development, and successfully achieving their development. Gustomo and Ghina (2017) insisted on the importance of a progressive approach to build an entrepreneurial university. This approach must integrate six phases. Table 2 traces these steps, based on their importance, to define a general single best integrative process as per the study objectives.

Table 2
Entrepreneurial university process

Phases	Objective	Output
Ontological assumptions	Understanding the concept: form and nature	University, government and industry must interact to promote science based on innovation
Epistemological assumptions	How do we know what EU really is?	A variety of definitions which insist on the interaction between people and their environment
Methodological assumptions	How to develop an entrepreneurial university: strategy, plan, process design	A systematic frame based on a “longitudinal process of social interaction within education boundaries”
Integrating concept	Integrative approach	Three approaches: what + when + how
Synthesizing the concept	To operationalize the concept, three missions of the EU are admitted	Integrative and complementarity between three missions
Building a framework for the EU	The importance of internal stakeholders’ abilities	The importance of engagement in the development of the EU.

Added to this procedural approach, many publications have highlighted the importance of context in the emergence and development of EU (Morris *et al.*, 2013; Fayolle & Redford, 2015; Curi *et al.*, 2012). Thus, the next step in this study is the determination of factors that stimulate this process and facilitate the ‘birth’ of a new university. Tekin *et al.* (2017) showed that the development of entrepreneurial universities is based on two different approaches. The first aims to increase entrepreneurial intentions and skills in order to define a range of awareness towards entrepreneurial efforts for students, who are considered customers (Kucukacan and Gur, 2009), while the second is related to structural transformations that provide universities with entrepreneurial and competitive structures (Altbach *et al.*, 2019). The first stage is related, according to the literature review, to the entrepreneurial orientation of the university, which is detailed in the rest of this paper, and the first step, which is considered here as involving the antecedents of the IPEU. Here, each element of the model is presented to facilitate the definition of a hypothesis. It must be remembered that the IPEU developed here is based on factors that act as determinants or stimulators for this process, which affects the Entrepreneurial Orientation of the University (EOU) and the three missions of the EU. At the end of this process, it will be possible to evaluate the success of the entrepreneurial process based on entrepreneurship standards and an innovativeness index, including concepts such as: entrepreneurial and innovative performance, entrepreneurship and innovation-oriented competition, and the development of an entrepreneurship ecosystem.

EU Factors

Rinne (2009) argued that the pathway to becoming an entrepreneurial university is activated by a range of internal and external factors. Others defined an ‘entrepreneurial architecture’ for EUs in terms of structure, system, leadership, strategy, and culture. Bekkers and Bodas (2008) talked about factors that can be developed to generate new knowledge and facilitate its transfer, which is the most important element of EU development. A variety of factors have been identified with different perceptions, which are formal (D’Este & Patel, 2007), semi-formal, or informal activities (Abreu & Grinevich, 2013). Foss and Gibson (2017) concluded that many forces interact at the regional, international, and national levels to stimulate or inhibit the development of an EU. Ziyae and Tajpour (2016) stated that four factors are important to facilitating entrepreneurial practices; organizational, individual, institutional, and environmental. In the same field, D’Este and Patel (2007) reported

that environmental factors determines individual behaviour in terms of culture, policies, and routines. Considering this, EU factors are interconnected and support each other. Katar and Antronic (2015) stated that entrepreneurial factors range from formal to informal (such as patenting, licensing, business activities, collaboration, and contract research) and include traditional factors (such as participating at conferences, scientific publishing, performing basic research, and teaching). Robers *et al.* (2015) studied the best practices for implementing the entrepreneurial university concept and found that the success of entrepreneurial activities is based on a combination of several factors. Ziyae and Tajpour (2016), however, presented a new approach with factors that support the objective of this study. Four groups of factors were mentioned: organizational factors, individual factors, institutional factors, and environmental factors.

Entrepreneurial University Orientation

Engagement in activities is considered important for creating economic and social value in entrepreneurial university partnerships (Abreu & Grinevich, 2013). In this view, universities must be engaged in technology and knowledge transfer (Grimaldi *et al.*, 2011). Agrawal (2001) argued that this engagement is determinant because it facilitates processes through which the activities of universities can be disclosed to university administrators. This last observation suggests that engagement must be developed across the university and its actors (students, academics, and admiration). The literature review shows that the entrepreneurial orientation of a university is a benefit when doing things in an entrepreneurial manner (Todorovic *et al.*, 2011). Morris and Paul (1987) considered entrepreneurial orientation (EO) as the “...*inclination of top management to take calculated risks, to be innovative, and to demonstrate proactiveness*”. The principal idea is that EOs determine the approach and entrepreneurial character of their activities (Kropp *et al.*, 2008). Lam (2010) stated that the manner in which environmental factors are perceived facilitates the acceptance of change and determines the level of engagement in different activities.

Entrepreneurship and the Innovativeness Index

Taucean *et al.* (2018) adopted HE Innovation to measure the ability of a university to be entrepreneurial, to facilitate entrepreneurial thinking, and to stimulate the creation and exploitation of business ideas. This tool was adopted in this research as “*self-assessment, guidance and good practice materials to take action for the effective management of institutional and cultural change*” (EC OCDE, 2016). Rasmussen *et al.* (2016) considered these activities, and especially those related to the commercialization of research, as affecting both teaching and research, considered here the main missions of the traditional university.

3. Conceptual Framework and Hypothesis

The following subsections will define the components of the conceptual framework and the study hypothesis related to the different relationships presented in the research model based on previous findings but combined in different ways.

Entrepreneurial University Factors and the Entrepreneurial Universities Index (EUI)

Lockett and Wright (2005) suggested that the development of an EU is based on four factors that can affect the “*rate of derivation activities*”: individual characteristics, organizational characteristics, cultural and institutional factors, and external environment. This typology is the same as that presented by Perkmann *et al.* (2013), who identified “*individual, organizational and institutional antecedents as the main factors effecting [the] entrepreneurial university*”. Culture, as an organizational factor, is important to providing an entrepreneurial atmosphere that disseminates knowledge, adds to traditional academic activities, and provides knowledge (Kirby *et al.*, 2011). In fact, the development and commercialization of knowledge stimulates the vision of the university (Wright *et al.*, 2007). Along these lines, Guerrero *et al.* (2006) argued that the role of an entrepreneurial university is not only to produce new knowledge, but to disseminate the knowledge generated to society and industry. So, the traditional missions of universities must be revisited in order to enhance the university entrepreneurial process. Chugh (2004) stated that an agile organizational structure can stimulate the development of innovative ideas, which is the third mission of entrepreneurial universities as discussed previously. Sweetman *et al.* (2010) stated that positive psychological capital is needed to provide innovative ideas. This can be defined through the university structure and can qualify as either a stimulator or a source of frustration. For their survival, universities have tried to adopt a new approach in response to environmental changes, based on two academics ‘*revolutions*’ (Leydesdorff & Etzkowitz, 2003). The first approach integrated research into the teaching mission, which forms the traditional and basic activities of universities. The second approach is a new orientation in which economic interest and enterprise is integrated into teaching and research to provide a third mission, which is called the entrepreneurial mission (Leydesdorff & Etzkowitz, 2003). As a university is reformed and developed to be more entrepreneurial, its entrepreneurial orientation starts to grow and may influence its activities, especially in academic terms (Todorovic *et al.*, 2011). Leydesdorff and Etzkowitz (2003) stated that an “*entrepreneurial orientation redirects academic research from basic to applied research*”: Thus, this study’s hypothesis is as follows:

H. The entrepreneurial orientation of a university moderates the relationship between EU factors and the Entrepreneurial University Index (EUI).

This means that there is positive link between EU factors and EUI that grows with entrepreneurial orientation. Fig. 2 shows the integrative process adopted by this research. This study considered the development of entrepreneurial universities to be conducted through a transformative process with three stages that uses EU factors as inputs and the EUI as an output. As mentioned in part one, this study adopted this indicator to measure the importance of entrepreneurial dimensions of a university. A university is entrepreneurial when the entrepreneurship and innovation index is high. This transformation needs an entrepreneurial orientation to maximize the use of EU factors. This process is based on entrepreneurial orientation, which, based on our analysis, regulates the use and direction of EU factors.

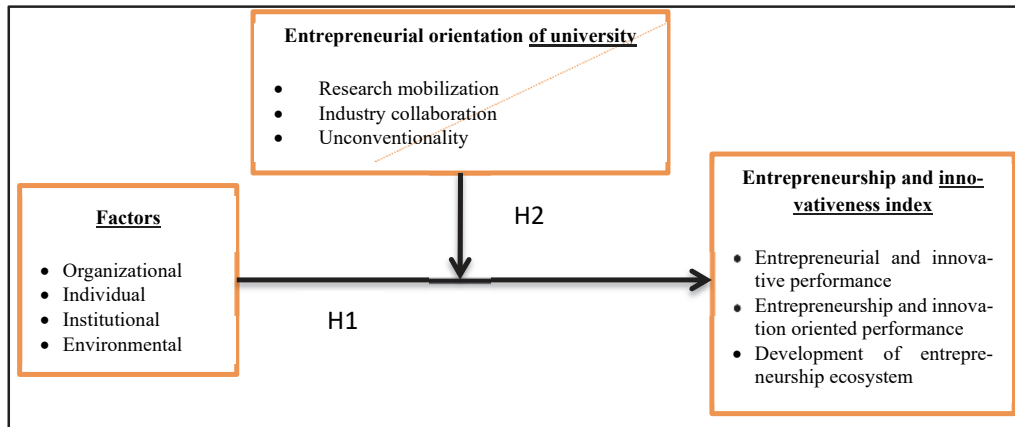


Fig. 2. The research model

3. Methodology

Most studies related to entrepreneurial universities reveal a tendency to use case studies to explain this phenomenon (Gartner & Birley, 2002). The current study's objective exceeds a simple explicative approach of this concept and seems to be larger and more practical. To reach the objective, two approaches will be used:

- A descriptive approach based on a survey in order to evaluate the ability of Qassim University to become an entrepreneurial university, based on the identified needs; and an exploratory approach, which aims to understand the different relationships between the components of an entrepreneurial university and the mechanisms needed to implement these practices. The descriptive approach adopts a qualitative methodology in order to understand how the entrepreneurial university can be defined in Qassim University, and to enumerate its multifaceted factors. This first step can help to define a mind map of the entrepreneurial university which can be adopted by researchers to understand its composition and to develop an appropriate scale for its dimensions. Face-to-face interview is a well-established approach for this research stage. Four questions were prepared:
 - How can the concept of the entrepreneurial university be represented?
 - Why does this concept seem to be important? Is your university already entrepreneurial? How can we improve this idea in your university? The exploratory approach adopts a quantitative method through questionnaire to collect data and test the hypothesis. The items used will be detailed in this section. Each person at the university should be able to complete the questionnaire, because all university stakeholders are supposed to be familiar with the university's strategy. Added to this, the structural equation model (SEM) for testing the research hypothesis was applied via AMOS 24.

Variable measurement and questionnaire design

The questionnaire used here is structured into four main sections; factors, entrepreneurial orientation, missions and entrepreneurship and innovativeness index. All items were evaluated using a five-point Likert scale, and were translated from English to Arabic in order to facilitate administration, and integrated into a questionnaire. The tailored design method was adopted for a successful self-administrated survey based on the directives of Dillman (2007).

The moderator variable: EO

The EO was measured based on the entrepreneurial university scale developed by Todorovic *et al.* (2011), which can be considered as an appropriate measure in the individual academic context (Kalar & Antonic, 2015). Respondents must indicate the level of their agreement on a Likert scale with 22 items divided into four dimensions; research mobilization, industry collaboration, unconventionality and university policies.

The independent variable: factors for entrepreneurial university

Factors of entrepreneurial universities are assimilated to stimulators which can enhance the development of EU. These exist as a part of the internal and external environment, which provide 'a push' for the development of EU. To appreciate these factors, we adopted a scale of a good practices developed by Fernandez-Nogueira *et al.* (2018). A total of 14 best practices with different items that can enhance the process are shown here.

The dependant variable: Entrepreneurial University Index (EUI). The index of EU is based on the value of university missions. As we mentioned, three main missions were developed in order to define the concept of our research. We can admit that the importance of these missions and the coherence between them determine the level of EU. So, an EU must be able to guarantee the preservation and dissemination of knowledge, and use different ways to teach this knowledge. Etzkowitz's (2004) study was devoted to research and publication on theoretical issues and all researchers generated by universities must be a source of innovation and feed the new needs of markets in different ways. Added to this, researchers must have a positive effect and contribute to the development of the economy and society (Schulte, 2004) through practical implications to provide responses in a multidisciplinary context and for a variety of new companies operating in the new economic conditions (Etzkowitz, 2004; Arvantis *et al.*, 2008; Bekkers & Bodas Friitas, 2008; D'Este & Patel, 2007; Ponomariov, 2008).

Table 4
The measurement items of all research constructs

Authors	Factors	N	The items
<i>Steffensen et al., 2001</i>	Individual factors	5	<ul style="list-style-type: none"> • Experience • Independency • Ground breaking behaviours • Risk Taking • Innovation
	Organizational factors	4	<ul style="list-style-type: none"> Organizational Structure • Organizational Strategies • Resources • Processes
	Institutional factors	4	<ul style="list-style-type: none"> • Social Norms • Entrepreneurial Culture • Staff Attitudes • Social Values
	Environment factors	3	<ul style="list-style-type: none"> Regulations • Entrepreneurial Marketing • Administrative Considerations
EO <i>Kalar and Antonic (2015)</i>	Research mobilization	6	<ul style="list-style-type: none"> RM1 We encourage our graduate students to engage in research with significant implications for industry or society RM2 We encourage students to seek practical applications for their research RM3 Faculty members in our department emphasize applied research RM4 Compared to other similar departments in our province, our department has a reputation for its contribution to industry or society RM5 Many of our faculty members conduct research in partnership with non-academic professionals RM6 Our faculty members are expected to make substantial contributions to industry or society
	Industry collaboration	5	<ul style="list-style-type: none"> IC1 We encourage industry involvement in the research activities of our faculty members IC2 Our department is highly regarded by industry IC3 We are recognized by industry or society for our flexibility and innovativeness IC4 We believe that our department should build relationships with private or public sector organizations IC5 Our graduate students often secure high quality industry positions
	Unconventionality	8	<ul style="list-style-type: none"> UC1 Cooperation with organizations outside the university significantly improves our research activities UC2 Our faculty members often seek research opportunities outside the traditional university environment UC3 We seek significant funding from sources other than the Tri-councils UC4 Compared to other similar departments in our province, our faculty members are known as very efficient and productive researchers UC5 We try to generate off-campus benefits from research projects UC6 Compared to other similar departments in this province, we are good at identifying new opportunities UC7 We support our faculty members collaborating with non-academic professionals UC8 When we come upon an unconventional new idea, we usually let someone else try it and see what happens (reverse coded)
	University policies	4	<ul style="list-style-type: none"> UP1 We feel that university-wide policies at this university contribute substantially towards our department achieving its goals and objectives UP2 Our university policies are best described as developed "bottom-up" using feedback from all levels of the university UP3 Compared to most other universities, our university is very responsive to new ideas and innovative approaches UP4 Our department is given significant latitude when evaluating faculty members performance

Table 4

The measurement items of all research constructs (Continued)

Authors	Factors	N	The items
Entrepreneurial university index <i>OCDE (2011)</i>	Leadership and Governance	5	Entrepreneurship is a major part of the university strategy There is commitment at a high level to implementing the entrepreneurial strategy. The university has a model for coordinating and integrating entrepreneurial activities at all levels across the university. The faculties and units have autonomy to act. The university is a driving force for entrepreneurship development in the wider regional, social and community environment.
	Organisational Capacity, People and Incentives	5	The university's entrepreneurial objectives are supported by a wide variety of funding sources/investment, including investment by external stakeholders. The university has a sustainable financial strategy in place to support entrepreneurial development. There are mechanisms in place for breaking down traditional boundaries and fostering new relationships - bringing internal stakeholders together (staff and students) and building synergies between them. The university is open to recruiting and engaging with individuals who have entrepreneurial attitudes, behaviors and experience. The university invests in staff development to support its entrepreneurial agenda.
	Entrepreneurship development in teaching and learning	6	The university is structured in such a way that it stimulates and supports the development of entrepreneurial mindsets and skills. Staff take an entrepreneurial approach to teaching in all departments, promoting diversity and innovation in teaching and learning. Entrepreneurial behavior is supported throughout the university experience; from creating awareness and stimulating ideas through to development and implementation. The university validates entrepreneurship learning outcomes. Collaborating and engaging with external stakeholders is a key component of teaching and learning development in an Entrepreneurial University Research results are integrated into entrepreneurship education and training
	Pathways for entrepreneurs	7	The university raises awareness of the value/importance of developing entrepreneurial abilities amongst staff and students. The university actively encourages individuals to become entrepreneurial. The university provides opportunities to experience entrepreneurship The university provides support for individuals and groups to move from entrepreneurial ideas to action. Mentoring by academic and industry personnel is available The university facilitates access to private financing for its potential entrepreneurs. The university provides access to business incubation facilities.
	University – business/external relationships for knowledge exchange	5	The university is committed to collaboration and knowledge exchange with industry, society and the public sector. The university demonstrates active involvement in partnerships and relationships with a wide range of stakeholders. The university provides opportunities for staff and students to take part in 13 entrepreneurial activities with business/the-external environment. The university specifically supports staff and student mobility between academia and the external environment. The university links research, education and industry (wider community) activities together to affect the whole knowledge ecosystem.
	The Entrepreneurial University as an internationalised institution	5	Internationalization is a key part of the university's entrepreneurial strategy. The university explicitly supports the international mobility of its staff and students (including PhD students). The university seeks and attracts international and entrepreneurial staff (including teaching, research and PhDs) The university demonstrates internationalization in its approach to teaching. The university, its departments and faculties actively participate in international networks.
	Measuring the impact of the Entrepreneurial University	5	The university assesses the impact of its entrepreneurial strategy and the strategy is responsive to change. The university assesses the level of engagement in entrepreneurial teaching and learning across the institution. The university assesses the level of engagement in entrepreneurial teaching and learning across the institution. The university carries out regular monitoring and evaluation of the universities' knowledge exchange activities. The university carries out regular monitoring and evaluation of the impact of start-up support.

To rate the level of the entrepreneurial aspect of a university, OECD (2011) defined a scale ranging from 0 (very weak) to 10 (very strong) in seven areas: leadership and governance; organizational capacity; people and incentives; entrepreneurship development in teaching and learning; pathways for entrepreneurs; university-business/external relationships for knowledge exchange; the entrepreneurial university as an internationalized institution; and measuring the impact of the entrepreneurial university. Sperrer *et al.* (2016) rephrase these aspects to form 13 practices. But the index developed by Tekin *et al.* (2017) seems more appropriate because it retraces, according to our analysis, the different components and aspects of EU and is

more general. This index is based on 52 items but some items will not be applicable. In fact, after the process of contextualisation, some items were deleted. The measurement items of every construct are shown in Table 4.

Sample data collection

This study collected data from university partners. Based on the literature review, all partners of the university have to contribute to the process of development of the EU. Each partner has a specific effort to contribute, with their role(s) depending on the missions of the EU. We selected sample randomly. We issued 300 questionnaires and 80 questionnaires were not returned. The response rate was about 74%, and we rejected 9 because they contained incomplete responses. Therefore, only 211 valid questionnaires, provided by students, teachers and administrative staff, are included in the analysis. A descriptive analysis of responses is reported in Table 1.

Data analysis and results

IBM SPSS Statistics 21 were used for descriptive analysis, reliability analysis and exploratory factor analysis (EFA), which was conducted using a varimax rotation. Confirmatory factor analysis (CFA) was performed using AMOS 24 to facilitate the test hypothesis related to the moderator effect of EO. For the hypothesis test of moderation, six steps were adopted, following Ping (1995). This choice is guided by the recommendations of different researchers. It is described as simple with the same rigor as the other analysis approaches of interaction effects (Cortina *et al.*, 2001).

Preliminary analysis

(1) Pre-testing

The questionnaire was reviewed by a group of fifteen people, divided across students, academics and personnel administration. Each group was composed of 5 people. Feedback and comments were incorporated to establish the final version of the survey. At the end of this process, the questionnaire was pre-tested to make sure that it would be adequate.

(2) Non-response bias

To be sure that non bias would not be a problem, the study adopted the Armstrong and Overton approach (1977). The t-test result shows that there is not a problem with non-response, and $p \leq 0.05$.

4. Result Analysis and discussion

The first step of our analysis was a descriptive analysis for respondent's in order to determine characteristics of our sample. Results are summarized in Table 3.

Table 3
Respondents' profile information (N=210)

Characteristics	Categories	Frequency	Percentage
Age	18-25	81	38.6
	25-45	84	40
	45-65	45	21.4
Gender	Female	68	32.4
	Male	142	67.6
Position	Student	31	14.8
	Academic staff	171	81.4
	Administrative staff	8	3.8
Department	Business administration	15	7.1
	Management information system	75	35.7
	Finance and economics	23	11
	Accounting	97	46.2
Level	Doctor	101	48.1
	Master	94	44.8
	Baccalaureate	15	7.1

After this an exploratory analysis is adopted. The objective was to test the coherence and the validity of our skills. Purification items according to the factorial contribution and Cronbach's Alpha was elaborated.

4.1. Exploratory factorial analysis

Table 4 retraces general results of components analysis with SPSS 21. The composite reliability for our variables is acceptable. The average variance extracted is used to fix axis or factors for each variable. We have listed the Cronbach's Alpha coefficient calculated by SPSS 21. All measurement indexes are acceptable which permit us to conclude that variables used have a good reliability.

Table 4
Results of component analysis

Variable	Sub – variable	Items	Total variance explained	Cronbach's Alpha	KMO
Factors	Individual factors	5	16.35	0.75	0.805
	Organizational factors	4	24.63	0.83	
	Institutional factors	4	No representative		
	Environment factors	3	14.47	0.80	
EO	Research mobilization	6	26.16	0.79	0.827
	Industry collaboration	5	5.8	0.64	
	Unconventionality	8	7.21	0.85	
	University policies	4	8.57	0.72	
Entrepreneurial uni- versity index	Leadership and Governance	5	4.42	0.81	0.68
	Organisational Capacity, People and Incentives	5	13.21	0.61	
	Entrepreneurship development in teaching and learning	6	3.97	0.84	
	Pathways for entrepreneurs	7	22.97	0.78	
	University – business/external relationships for knowledge exchange	5	6.82	0.83	
	The Entrepreneurial University as an internationalised institution	5	5.30	0.73	
	Measuring the impact of the Entrepreneurial University	5	3.21	0.76	

Data here is suitable to the structural equation model method. Items which represent a weak contribution or internal coherence are deleted. Based on results of components analysis we will restrain our analysis to the moderator effect of the main components. So, hypothesis of the moderating effect can be represented by:

H_{1.1}: Research mobilization moderates the link between individual factors and pathway for entrepreneurs.

H_{1.2}: Research mobilization moderates the link between organizational factors and pathway for entrepreneurs.

H_{1.3}: Research mobilization moderates the link between environmental factors and pathway for entrepreneurs.

4.2 Measurement model

In this state, the individual reliability of items is examined, industry collaboration and organizational capacity, people and incentives are deleted due to the low level of alpha de Cronbach which must be acceptable at 0.7. After this, the reliability of scale for the measurement model will be appreciated by the composite reliability with an acceptance range of 0.7. Added to these indicators, the convergent reliability must be analysed by the AVE (average variance extracted) calculate through regression and Standardized Regression Weights. The minimum value accepted by the literature is 0.5.

Table 4
Indicators for the evaluation of the measurement model

Construct	Mean	Weights	α	CR	AVR
Research mobilisation					
RM1	5.01	0.44	0.79	0.90	0.79
RM2	4.87	0.69			
RM3	3.79	0.71			
RM4	3.87	0.68			
RM5	1.99	0.31			
RM6	1.01	0.49			
Individual factors					
INDF1	3.14	0.72	0.75	0.82	0.76
INDF2	3.24	0.77			
INDF3	2.79	0.64			
INDF4	2.76	0.62			
INDF5	3.11	0.63			
Organizational factors					
OF1	2.11	0.46	0.83	0.82	0.73
OF2	3.09	0.62			
OF3	3.98	0.82			
OF4	3.01	0.50			
Environmental factors					
ENVF1	2.89	0.88	0.8	0.85	0.799
ENVF2	3.04	0.90			
ENVF3	2.79	0.73			
Pathway for entrepreneurs					
OI1	4.01	0.68	0.78	0.71	0.69
OI2	2.99	0.42			
OI3	2.97	0.43			
OI4	2.95	0.49			
OI5	5.04	0.83			
OI6	2.91	0.48			
OH7	2.78	0.43			

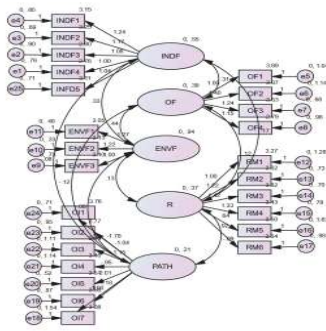


Fig. 3. Measurement model

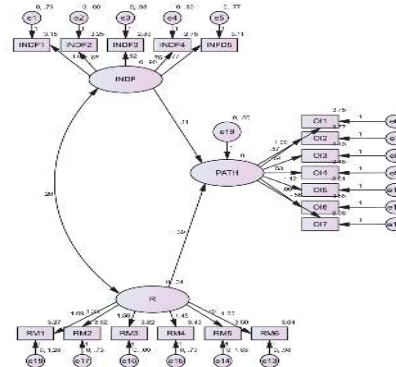


Fig. 4. Structural model between research mobilisation, individual factors and pathway for entrepreneurs

The discriminate validity of this model is considered satisfied according to the recommendations of Fornell and Larcker (1981).

4.3 Structural model

In this part, structural model related to each hypothesis was appreciated in order to determine the degree of fit.

H1. Research mobilization moderates the link between individual factors and pathway for entrepreneurs.

The goodness of fit of factors in this model are acceptable. The link between individual factors as an independent variable and pathway for entrepreneurs as dependant variables exists but with low level (0,11). As shown the relation between the moderating variable as a part of this structural model with the dependant and independent variable is valuable but not strong enough.

Table 5

The goodness of fit of factors

Fitting index	CMIN/DF	GFI	AGFI	NFI	IFI	CFI	RMR	RMSEA
Evaluation criterion	<3	>0.9	>0.8	>0.9	>0.9	>0.9	<0.05	<0.08
Test value	2.7	0.914	0.809	0.922	0.935	0.932	0.024	0.077

H2. Research mobilization moderates the link between organizational factors and pathway for entrepreneurs

The second structural model relate organizational factors as independent variable with pathway for entrepreneurship as dependant variable with a moderator variable research mobilization. Our objective was to appreciate the goodness of fit between variable and the relations between the three variables as related constructs.

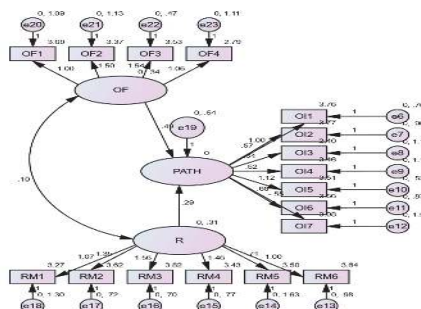


Fig. 5. Structural model between research mobilisation, organizational factors and pathway for entrepreneurs

All indicators of fit were acceptable and confirm relations between variables as specified in our second hypothesis. The most important result as shown in the Fig. 4 is the relation between organizational factors(independent variable) and pathway for entrepreneurs(dependant variable). This relation exists with an important level (0.49).

Table 6

The goodness of fit of EO

Fitting index	CMIN/D F	GFI	AGFI	NFI	IFI	CFI	RMR	RMSEA A
Evaluation criterion	<3	>0.9	>0.8	>0.9	>0.9	>0.9	<0.05	<0.08
Test value	2.7	0.922	0.811	0.931	0.924	0.910	0.014	0.064

In this state, we have to elaborate the last structural model of this research related to our third hypothesis.

H₃. Research mobilization moderates the link between organizational factors and pathway for entrepreneurs.

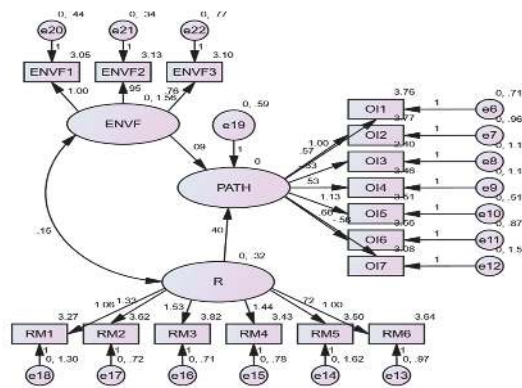


Fig. 6. Structural model of environment factors, pathway for entrepreneurs and research mobilization

Results of this structural model show that the relation between our independent variable (environmental factors) and dependent variable (pathway for entrepreneurs) which is the relation to moderate is very low (0.09) but it can exist. In the next section we will be able to appreciate if this relation can be maintained and reinforced by research mobilization or it can be delayed.

4.4 The moderating effect of research mobilization (as a principal determinant of EO)

Hypotheses of this research have been tested using structural equations model. The significance of the structural links as well as its levels represent the hypothesis of research. The hypothesis test was elaborated using AMOS 24. According to Ping (1995), six steps must be elaborated to test the moderating effect. The global adjustment indices and the significance of the structural links between constructs will be used to verify the hypothesis of research.

Step 1: Conduct a confirmatory factor analysis with the variables X_p and Z, as well as the other variables of the model, to determine the factorial contributions of the different indicators X_i and Z_j added to the corresponding error terms. The analysis process is iterative and stops when the adjustment indices are acceptable.

Step 2: Center all indicators of the variables on the model, subtracting from each variable the average. This operation makes it possible to reduce the multi-collinearity between variables X_p and Z and their product (X_p × Z).

Step 3: Calculate the indicator of the interaction (X_p * Z). The indicator of the interaction effect, representing the moderating role, is obtained by making the product of the sum related to indicators of the explanatory variable and the moderating variable (Σx_i × z_j). The factorial contribution λ_{xz} and the error θε_{xz} of the interaction effect are calculated by the following equations:

$$\lambda_{xz} = \sum \lambda_{xi} \times \sum \lambda_{zj}$$

$$\theta\epsilon_{xz} = (\sum \lambda_{xi})^2 \times \text{VAR}(x) + (\sum \theta\epsilon_{zj}) + (\sum \lambda_{zj})^2 \times \text{VAR}(z) + (\sum \theta\epsilon_{xi}) + (\sum \lambda_{xi}) \times (\sum \lambda_{zj})$$

Step 4: Test the structural model allowing to estimate the coefficients b₁ and b₂, linking X_p and Z to the dependent variable Y: (Y = a + b₁ X_p + b₂Z).

Step 5: Test the structural model by integrating the product (X_p * Z), fixing its factorial contribution λ_{xz} and its error θε_{xz}. This step makes it possible to estimate the significance of the coefficient b₃ measuring the moderating effect (Y = a + b₁ X_p + b₂Z + b₃ X_p × Z).

Step 6: Ensure that the product integration (X_p × Z) does not deteriorate the fit of the model, and rather improves its predictive power (R²). The moderating effect is evaluated by the significance and the sign of the coefficient b₃ (Schumacker & Marcoulides, 1998). At first, and in accordance with assumptions, we examined the relationship between factors of entrepreneurial university and entrepreneurial university index. The analysis of the results showed that there is a positive and significant relationship between these variables. The normality test based on Kurtosis and skewness is elaborated by SPSS 24 and all indicators are acceptable. The friability and the validity of all variables have been also acceptable. The raw data were all centered to reduce the multicollinearity between the multiplicative term and the interacting variables. The averages are calculated and subtracted from the raw data using SPSS. At this level, the hypothesis test can be treated. The result of the confirmatory factorial analysis is detailed below for every construct and the goodness of fit test for each model is discussed.

4.2.2. Multiplicative term calculation and hypothesis test

For the analysis of the moderating effects, the respective values of the factor contribution of the variable INTERACT (RM ×

Factors: individuals, organizational and environmental) and the error of variance were calculated according to Ping approach in order of 9.03 and 20.36. It is now necessary to check whether the introduction of the INTERACT variable, that we have just calculated, does not deteriorate the significance of the initial model and how it improves the predictive power of the model. Finally, accepting or rejecting the moderation hypothesis will depend on the value and significance of the correlation index of the INTERACT variable with the dependent variable pathway for entrepreneurs. To calculate this term, we used frequencies and compute variables from SPSS 24.

Table 6

Results for structural model evaluation

Constructs	γ	T- Student	R ²
INDIVF → PATH	0.411	2.476	48.8
INDIVF×RM → PATH	0.461	2.582	53.1
OF → PATH	0.520	2.499	35.7
OF×RM → PATH	0.488	2.367	56.3
ENVF → PATH	0.564	2.133	42.4
ENVF×RM → PATH	0.98	2.244	55.6

In accordance with our assumptions, we examined the relationship between factors of entrepreneurial university and entrepreneurial universities index. The analysis of results shows that there is a positive and significant relationship ($\gamma = 0.411$, $t = 2.476$). This result confirms what we have found in the literature, which suggests that factors stimulate and determine the evolution of universities to become entrepreneurial. In regards to the hypothesis, results show that the interaction between “entrepreneurial orientation” and “factors” has generated an increase in the effect of the variable “factors” on entrepreneurial universities index of university surveyed. By examining the positive and significant sign of the gamma coefficient ($\gamma = 0.461$, $t = 2.582$, $p < 0.05$), linking the product (EO / factors) and EU, it seems to us that this goes in the direction of complementarity between the independent variable and the moderator variable. The share of the variance in performance explained by the regression is 53.1%. The moderating effect of EO on the relationship that links the factors to EU is thus verified in this study. The hypothesis that the presence of EO of university strengthens this relationship is confirmed. We can conclude that factors exist anyway, and must be exploited in the right way to make the successful transformation of university and make a competitive advantage, but the entrepreneurial orientation of university must be stimulated in the same way by research mobilization, industry collaboration, unconventionality and universities policies. As the EO of university increases, the probability of the integrative process for entrepreneurial university becomes easier and hence success more likely.

5. Theoretical contributions

This research is one of the few studies to have attempted to understand how universities in the Arabic world can integrate entrepreneurial aspects and become more interactive with society. The importance of such a concept has been discussed in many studies and by many researchers, but the processes related to it and approaches to managing it are still poor, especially in the Arabic world. This research contributes to enriching theoretical studies about this phenomenon. In fact, the study is an attempt to join important elements of the EU in an integrative process, the steps of which are related to the strategic planning approach because EUs seem to be dynamic and multidimensional, as shown here. The IPEU which emerges based on this empirical investigation demonstrates that to be entrepreneurial, universities have to manage a process of change from a traditional approach to a modern one with three main missions. Teaching and research activities seem to be habitual, but the third kind of activities, which are related to entrepreneurial approaches, must be integrated based on achieving complementarity with teaching and research. The approach adopted here for the definition of the IPEU adopts an exhaustive and super-imposed approach; three stages of management process of change, the strategic planning approach and an integrative approach to the characteristics, activities, factors in and variables of EU as defined in the literature review.

5.1. Managerial implications

The IPEU developed here can be considered as a roadmap for every institution or university which aims to undertake a successful transformation to become an entrepreneurial university, considering especially the positive effects of this transformation on social and economic factors, as demonstrated in the previous sections. In sum, this research presents important managerial implications for university partnerships (academics, administrative and industry), and the success of the IPEU developed here can bring benefit for all. The findings indicate that this process can enhance the entrepreneurship and competitiveness of the university which can contribute to the development of the economy. In fact, no one can deny the positive and important role of entrepreneurship for development. Also, the study provides an exhaustive list of factors (antecedents) for the success of the IPEU in order to facilitate its operationalization. The most important contribution seems to be a dynamic approach to the process and its multidimensionality. The contribution of EO as moderating variables demonstrates that this process can emerge only if stakeholders work together based on an optic of the “win-win” relationship. The IPEU is a process which requires external and internal factors with a simultaneous relationship on different levels (missions). This can help each partner or managerial body to attribute who is responsible for what. In other words, this process makes the planning of this transformation easy and clear. The association between relevant factors and missions is also important, because it makes decisions more efficient. Consequently, it provides the one best way to reinforce missions which require consolidation. This contributes to the definition of complementarity between what is missed in achieving the standards of an EU.

6. Limitations and future research

Findings presented here are important and beneficial, but it must be remembered that some limitations must be considered. First, it is probable that there are some specific factors which can have effects on this process in addition to those discussed here. Second, the specificity of this process must be analysed through a longitudinal approach. This facilitates evaluation and provides a deeper analysis for each step in terms of evaluation and practices. Third, it would be interesting to integrate the international context into such research. A comparative study could consolidate these findings and define whether there are specific factors for each culture. This is related especially to the possibility of generalising the current results. Added to this, and to take a more exhaustive approach, it is suggested that some variables may be moderated; we believe that moderation of some variable must be signed and its identification can be facilitated by a longitudinal and comparative analysis. Finally, it is acknowledged here that this IPEU is a primitive version of a successful transformation for the EU, and while it presents the basis for a new orientation for universities in general and in the Arabic world specifically, there is a need for future studies to enrich and consolidate the logic adopted here. The findings presented define theoretical and managerial implications which provide beneficial directives and a solution to universities for survival and development for the best in response to continuous change. The university here is considered as both an objective and subject of the same transformation. We hope this research constitutes a source of inspiration for researchers to conduct further investigations in this important and determinate field.

7. Conclusion

The inference from the result findings of these analysis is tackling the influential factors related to Organizational, Individual, Institutional, Environmental, Entrepreneurial orientation of university and Entrepreneurship and innovativeness index. In addition, effective application of the principles of integrative process towards entrepreneurship performance in entrepreneurial University approach would go a long way in Entrepreneurship performance in Entrepreneurial of Qassim University. To enable effective implementation of the model, Qassim university senior management have some roles to play in the areas of the need to redirect applying the model priorities towards improving the CBE, in line with strategic planning and due to the importance of entrepreneurship in the Vision 2030, tends towards developing an entrepreneurial orientation and integrates some good practices of the integrative process for the entrepreneurial university (IPEU). The main contribution of this paper is to identify the path diagram and adequate practices to adopt in order to achieve entrepreneurial university standards. Essentially, as revealed through the review of literature, there must be intensity in research from this aspect as already highlighted that there is dearth of research in this regard, especially in the developing countries like KSA. This might have contributed to the reason why the concepts of the model are yet to be fully seen to have been implemented. This research is expected to contribute significantly to the body of knowledge as well as professional circles. More importantly, this research would contribute positively to academic practice by boosting high education investment, thereby promoting a better professionalism. The research is seen to be a good ground for further researches.

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