

Advancing Entrepreneurial University from EU-OECD Framework Empirical Evidence of Jouf University

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Abstract :

This research analyses how the EU-OECD framework advances entrepreneurial university characteristics in one of the emerging universities in Saudi Arabia via conducting a case study on Jouf University. An EU-OECD questionnaire was distributed to employees at the University in 2022, and 54 respondents were received with administrative mandates. The study found that EU characteristics in Jouf University performed averagely, where further enhancements are required to increase their impact regarding entrepreneurial teaching, knowledge exchange, and start-up support. This can be achieved easily since all EU characteristics and EU impact are strongly related. Accordingly, Jouf University needs to ensure that the EU aspects are applied, starting with strategy and initiatives and assessing the progress of transforming into the EU according to the new system. This means implementing and evaluating the seven dimensions of EU in Jouf University, where all leaders, faculty, staff, and students must be involved. Jouf University can play a social and economic role by supporting spin-off creation, easing resource access, facilitating technology transformation, research orientation, entrepreneurial orientation, and market hostility. Additionally, Jouf University can contribute significantly to the creation of spin-offs and the long-term growth of the EU, which can be one of the most significant impacts on the EU socially and economically.

Keywords: Entrepreneurial University, EU-OECD Framework, Higher Education Innovation, Knowledge Exchange, Start-up Support, Entrepreneurial Teaching, Market Orientation.

JEL Classification Codes : I23, L26, O32

Introduction:

Entrepreneurship ecosystem (EE) can be defined as different elements that interact in complex ways and influence entrepreneurship development (Isenberg, 2011); these elements or factors can be different from one economy to another depending on the level of the EE. According to Khan (2016), the level of EE in Saudi Arabia is on an institutional level, meaning institutions in the government and private sector can play a significant role in entrepreneurship development. Universities can be an essential factor in developing an entrepreneurship ecosystem in a particular economy (Mason & Brown, 2014), as the universities' role has been developed from just considering research and teaching to influencing entrepreneurial activities that might have social and economic impact (Cerver Romero et al., 2021) and therefore developing entrepreneurship ecosystem.

EU can play a significant role economically and socially. Economically, the EU can facilitate knowledge creation, knowledge spillovers (Acs et al., 2013), and technology transfer (Valdivia, 2013), thus generating substantial income for the University. In addition, the EU can contribute to regional economic growth (Acs et al., 2013) and the entrepreneurial ecosystem via commercializing knowledge and innovation (Bramwell & Wolfe, 2008). According to Audretsch (2014), besides the role of the EU in generating knowledge-based ventures, the EU's role broadens to social impact, which can be seen in enhancing entrepreneurship capital and facilitating behavior to prosper in an entrepreneurial society.

Accordingly, the EU can facilitate the economy by transferring from a resource-based economy to a knowledge-based economy, which is one of the main objectives of Vision 2030 in Saudi Arabia. A knowledge-based economy relies on scientific and technical advances rather than natural resources, such as oil, for its economic growth. The knowledge-based economy is an evolution of innovation and highly skilled human resources (Ejdys et al., 2015), and to achieve this, an entrepreneurial ecosystem needs to be developed, and since universities are essential players in the ecosystem and can contribute significantly to transferring to a knowledge-based economy in Saudi Arabia.

There was increasing interest by researchers and policymakers in developing innovation and entrepreneurship, in addition to commercializing innovation and knowledge in Saudi Universities. Alghamdi (2020) suggested a paradigm for Saudi universities to help them in their transformation process based on the OECD framework of the EU. The paradigm suggested four stages for transformation into the EU. These include adopting the idea of the EU in Saudi universities, experimental application, evaluating the experience, completing the application, and generalizing the experience. Since the education ministry adopted and announced different initiatives, some Saudi universities, especially the emerging ones, can be considered in the second stage. This indicates the need to do more research focusing on one of the emerging universities in Saudi Arabia by analyzing their transformation process based on the OECD framework. In addition, the OECD framework can present different dimensions of EU features that can assist researchers and decision-makers in adopting and developing this framework. In addition, it is essential, during analyzing and searching EU cases, to understand their main characteristics to understand their current stage, their strong and weak features, and what characteristics need to be developed to strengthen the impact of the EU and OECD framework of EU can assist these matters.

The framework of EU-OECD (2022) considers different features for self-assessment of higher education institutions, as the guideline can help the University to identify the strength areas and other areas to improve. The framework emphasizes the role of effective change management at the institutional and cultural levels of universities, as the EU can be defined based on seven characteristics. These include leadership and governance, organizational capacity, entrepreneurial education, entrepreneurs' pathways, external relations for knowledge exchange, internationalized institutions, and measuring EU impact. The result of each area can provide insight into the progress of change in a university, and it can be used to form a strategic plan to develop the weak areas.

Accordingly, this research aims to analyze how the EU-OECD framework can advance entrepreneurial universities by applying the EU OECD questionnaire to one of the emerging

universities in Saudi Arabia. Jouf University (JU) is one of the emerging universities in Saudi Arabia. Established in 2005, it adopted different strategies and initiatives to develop its entrepreneurial characteristics, especially in supporting research, innovation, and entrepreneurial activities. In addition, JU has launched different initiatives, strategies, and programs to support entrepreneurs and inventors as part of their strategic plan, as they established an innovation and entrepreneurship center in 2020 that links the University with the local society to develop the entrepreneurship ecosystem. Therefore, this study aims to address advancing entrepreneurial universities from the EU-OECD framework by providing empirical evidence of Jouf University, and this can be achieved by addressing the following questions:

1. What are the main entrepreneurial characteristics of Jouf University?
2. In which way can the main characteristics of Jouf University be improved?
3. What is the relationship between the characteristics of the EU and the impact of the EU on Jouf University?

1. Literature Review

The notion of an entrepreneurial university has changed considerably over time by applying the concept of enterprise or entrepreneurship to the university concept. According to Audretsch and Belitski (2021), there are three main rings in entrepreneurial universities: teaching, research, and entrepreneurship activities, as these activities enable collaboration between the University and industry and commercialize knowledge. This requires knowledge and entrepreneurial capital, meaning that the EU needs to support and encourage knowledge capital that can be seen in inventions, applied research, and R&D, as these require entrepreneurial capital to be commercialized. EU is not a business program aiming to support entrepreneurs; it is like an ecosystem that encourages entrepreneurial activities, as different stakeholders and players interact and influence entrepreneurial activities; these stakeholders are the University, government, and industry (Etzkowitz et al., 2008). In contrast, several elements not included in the framework need to be considered should be beefing or examining an EU, namely, leadership and governance, and organizational capacity that might influence entrepreneurial activities and thus influence their social and economic contribution.

EU has been discussed from different approaches: the triple helix model, the knowledge society model, and the researcher-entrepreneur model. Regarding the triple helix model, the EU is explained by its role in the knowledge society, as the EU has a third mission, alongside teaching and research, which is the economic contribution on regional and national levels (Etzkowitz et al., 2008). This model has been questioned by other researchers, namely Cook (2005), who argues that other models can explain the EU's contribution to economic development on the regional level. The knowledge society model suggests that the EU contributes to economic development at the regional level by generating different resources, such as knowledge, human capital, and entrepreneurship capital, which are the outcomes of teaching, research, and entrepreneurial activities. However, adopting this requires having a suitable environment (Cerver Romero et al., 2021). Last but not least, the researcher-entrepreneur model focuses on the role of the researcher's attitude toward entrepreneurship, as knowledge transfer between the University and industry, and the researcher is encouraged to participate in entrepreneurial activities. However, this approach has been criticized, and the quality and quantity of research work after participating in entrepreneurial activities have been questioned (Rammer et al., 2009).

Empirically, the EU was analyzed and searched from different perspectives, such as knowledge spillover (Guerrero & Urbano, 2014; Fuster et al., 2019) and stakeholders (Radko, 2022), and entrepreneurial University (Wong et al., 2007; Cunningham et al., 2022; Alghamdi, 2020). One study by Guerrero and Urbano (2014) focuses on the influence of knowledge on the entrepreneurial intentions of academics and how it is affected by different factors such as subjective norms and entrepreneurial university policies. Another study by Fuster et al. (2019) argued that the EU is a knowledge transfer mechanism in the ecosystem. According to Moussa et al. (2020), the EU is in the middle of the ecosystem and interacts with different stakeholders; these include the economy and society, researchers, students, administrators and coordinators, new ventures, and existing firms.

Interaction between these stakeholders helped shape the university business model through strategies (Miller et al., 2014). Another study by Bischoff et al. (2018) emphasizes the role of strategy in how the EU can manage its stakeholders, especially in terms of entrepreneurship education, to develop a supportive ecosystem and, thus, entrepreneurship development and their economic and social role. According to Guerrero and Urbano (2010), each University is unique in what factors influence attitudes toward entrepreneurship. However, the empirical studies still need to consider the external factors in the ecosystem that might influence the EU.

Other researchers have developed and discussed many models on how the EU needs to be in order to enhance its economic and social role in the region and play its role as a critical player in the ecosystem, adopting and developing a supportive ecosystem for commercializing knowledge and developing entrepreneurship through increased patenting, licensing to private industry and spinning-off new ventures (Cunningham et al., 2022).

However, most of the contributions focus on the EU internally and neglect the environmental factors that need to be considered in developing the EU to strengthen its role in the ecosystem. This means the EU needs certain qualities that consider internal and external relations to support its economic and social role in the ecosystem. In addition, universities need to have a vision and strategy that prioritizes innovation and entrepreneurship agendas, as this can only be adopted and applied with a high level of governance and capacity in the University. One of the key contributions in this regard is the OECD framework of the EU, which was developed based on European universities and adopted and examined by different scholars on different cases.

This framework emphasizes the role of effective change management at the institutional and cultural levels of universities, as the EU can be defined based on seven characteristics. These include leadership and governance, organizational capacity, entrepreneurial education, entrepreneurs' pathways, external relations for knowledge exchange, internationalized institutions, and measuring EU impact. The result of each area can provide insight into the progress of change in a university, and it can be used to form a strategic plan to develop the weak areas (EU-OECD, 2022). A study by Alghamdi (2020) suggested a paradigm to help Saudi universities transform, which includes adopting the idea of EU, experimental application, evaluating the experience, completing the application, and generalizing the experience. Since the education ministry in Saudi Arabia adopted and announced different initiatives, some Saudi universities, especially the emerging ones, can be considered in the second stage.

This indicates the need to do more research focusing on one of the emerging universities in Saudi Arabia by analyzing their transformation process based on the OECD framework. In addition, the OECD framework can present different dimensions of EU features that can assist researchers and decision-makers in adopting and developing this framework. In addition, it is essential during analyzing and searching EU cases to understand their main characteristics to understand their current stage, their strong and weak features, and what characteristics need to be developed to increase the impact of the EU and OECD framework of EU can assist these matters.

2. Conceptual and Empirical Framework

This research adopts the EU's OECD framework, as the EU can be defined based on seven characteristics. Figure 1 summarises the EU framework of the OECD, and Table 1 summarises the conceptual and empirical framework.

The first component of the framework is leadership and governance (LG), as it suggests that developing entrepreneurial culture and change in the University requires considering the entrepreneurial agenda on the strategic level. This can be seen in the university strategy, coordinating with stakeholders (internal and external), bureaucratic barriers, and the external environment, as the strategy of the EU on how stakeholders and entrepreneurship education can play significant roles in developing a supportive ecosystem (Bischoff et al., 2018). The interaction between these stakeholders helped shape the university business model through strategies (Miller et al., 2014), thus strengthening the economic and social role of the EU.

The second component is the organizational capacity, people, and incentives (OCPI), as it suggests that supporting and achieving strategic objectives requires organizational structure and approaches that can be seen in the entrepreneurial agenda. This component includes availability and variety of funding and investment, mechanism of resources exchanges, entrepreneurial culture, and staff development and reward. EU is a player in the ecosystem that interacts with different stakeholders (such as the economy and society, researchers, students, administrators, and coordinators) (Moussa et al., 2020) that influence venture creation and entrepreneurship development (Radko, 2022), where each University is unique in what factors that influence attitude toward entrepreneurship (Fuerrero & Urbano, 2010). According to Audretsch and Belitski (2021), the EU needs to support and encourage knowledge capital seen in inventions, applied research, and R&D, as these require entrepreneurial capital to commercialize them.

The third component is entrepreneurship development in teaching and learning (EDTL), which helps students and staff develop entrepreneurial mindsets and skills, promote innovation, and stimulate ideas. EU is an ecosystem that encourages entrepreneurial activities (Etzkowitz and colleagues, 2008), as knowledge, human capital, and entrepreneurship capital are the outcome of teaching, research, and entrepreneurial activities that are essential components of the ecosystem that strengthen the economic and social roles of the EU (Cerver Romero et al., 2021). Accordingly, researchers' attitudes toward entrepreneurship need to be considered in the EU, as knowledge transfer between University and industry by encouraging researchers to participate in entrepreneurial activities (Rammer et al., 2016) to develop the ecosystem and the role of the EU.

The fourth component is pathways for entrepreneurs (PE); the framework suggests that the EU needs to support entrepreneurs in their career development, which can be identified by developing an entrepreneurial mindset, skills, behavior, and opportunities. Universities need to think and behave within entrepreneurial strategies and develop entrepreneurial mindsets to address several issues, such as enhancing innovation and competitiveness via developing entrepreneurial skills and knowledge for entrepreneurs and students to advance their career paths (Gibb, 2012).

The fifth component is external relationships for knowledge exchange (KE), as it suggests that the EU needs to interact with the external environment to encourage knowledge spin-off, collaboration with industry, and commercializing knowledge capital (e.g., inventions, patents, and R&D). EU is a crucial element in regard of interaction between three main sectors in the ecosystem, these are University, industry, and government, where this interaction can help in venture creation, and developing a supportive strategy in the University to deal with innovation and venture creation. Stanford University is a model for this approach, especially in Silicon Valley, as the University developed University-industry and then university-government relationships as part of an increasingly explicit university-region co-development strategy (Etzkowitz et al., 2018). Accordingly, the EU can contribute economically by generating knowledge and entrepreneurship capital that is considered the outcome of research and entrepreneurial activities (Cerver Romero et al., 2021).

The sixth component is internationalized institutions (Intre), as the EU needs to reflect on the teaching, training, research, and entrepreneurial activities in the international environment with an entrepreneurial strategy to cover all these aspects. Internationalization in the EU has different dimensions, such as collaborations, joined research, and mobility of students and staff, where the strategy of the EU needs to consider having a sustainable entrepreneurial model for the University, as this can benefit knowledge and experience exchange, development of students, staff, and entrepreneurs (Ketikidis et al., 2012).

The final component is the ability to measure EU impact (EUI), which is underdeveloped. However, in the literature, EU impact can be measured by IP, spin-off, and research outcome. EU can play a social and economic role by supporting spin-off creation, easing resource access, facilitating technology transformation, research orientation, entrepreneurial orientation, and market hostility. Additionally, the EU can contribute significantly, not only in the creation of spin-offs but also in long-term growth, which can be one of the most significant impacts of the EU socially and

economically (Soetanto & Geenhuizen, 2019). This is because university spin-off companies are the main actors in the ecosystem and strengthen knowledge transfer by relating with other businesses beyond the University and ecosystem (Fuster et al., 2019).

Figure 1: EU Framework of OECD

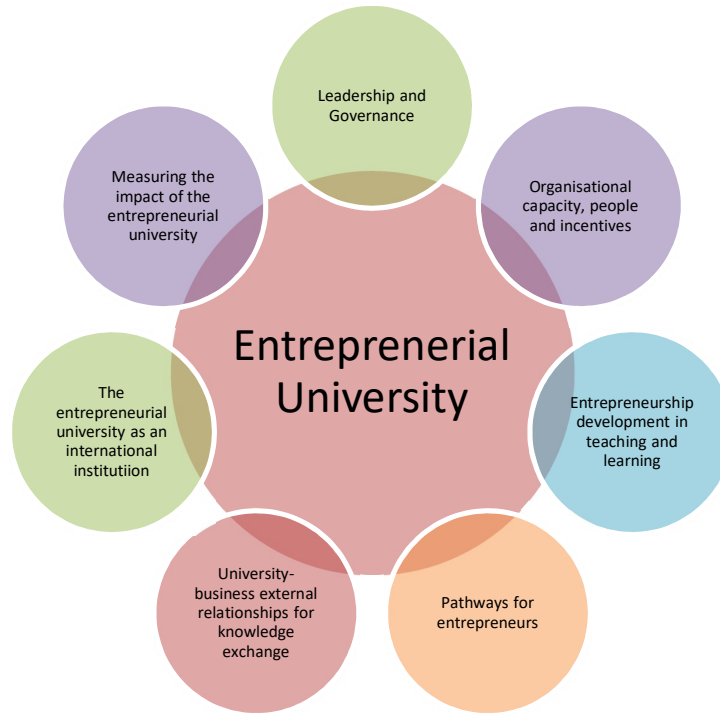


Table 1: Conceptual and empirical framework

EU Characteristics	Concept	Measurements
Leadership and governance	Considering the entrepreneurial agenda at the strategic level will help develop an entrepreneurial culture and bring about change in the University.	University strategy
		Entrepreneurial strategy
		Entrepreneurial activities
		Autonomy act
Organizational capacity, people, and incentives	Organizational structure and approaches are necessary to support and achieve the strategic objectives of the entrepreneurial agenda.	Entrepreneurship development
		Funding and investment
		Financial strategy
		Internal stakeholders
		Entrepreneurial attitudes and behavior engagement
		Staff development
Entrepreneurship development in teaching and learning	Developing entrepreneurial mindsets and skills, promoting innovation, and stimulating ideas can be achieved by teaching and learning about entrepreneurship.	Incentives and rewards
		Stakeholders' recognition
		Entrepreneurial mindset and skills
		Entrepreneurial education
		Entrepreneurial behaviour
		Entrepreneurship learning
		Collaboration
		Research results
		Entrepreneurial abilities

EU Characteristics	Concept	Measurements
Pathways for entrepreneurs	We support career development by developing entrepreneurial mindsets, skills, behavior, and opportunities.	Entrepreneurship encouragement
		Entrepreneurship opportunities
		Entrepreneurship support
		Mentoring
		Access to financial resources
		Incubation
University-business external relationships for knowledge exchange	Interaction with the external environment to encourage knowledge spin-off, collaboration with industry, and commercializing knowledge capital.	Knowledge exchange
		Partnerships
		External initiatives
		External environment
		Mobility support
International institution	Our international environment includes teaching, training, research, and entrepreneurial activities.	Knowledge ecosystem
		Internationalization
		International mobility
		International entrepreneurial staff
		International teaching
Impact of Entrepreneurial University	We assess the impact of entrepreneurial strategy, entrepreneurial teaching and learning, knowledge exchange, and start-up support.	International network
		Entrepreneurial strategy impact
		Entrepreneurial teaching assessment
		Entrepreneurial teaching impact
		Knowledge exchange evaluation
		Start-up support impact

3. Methods

3.1. Research Design

As mentioned before, each University is different and can present different stages of EU transformation, especially emerging universities, which can enrich the field with helpful knowledge for researchers and decision-makers in universities. Accordingly, this research adopted a case study methodology to collect and analyze data from Jouf University. This University is one of the emerging universities in Saudi Arabia that adopted different strategies and initiatives to develop its entrepreneurial characteristics, especially in supporting research, innovation, and entrepreneurial activities. Based on the OECD framework of the EU, the data collection method was designed to answer the central questions of this study and expand the understanding of the EU phenomena by focusing on one case.

3.2. Data Collection

This research aims to analyze the characteristics of the EU by providing empirical evidence from Jouf University, one of the emerging universities in Saudi Arabia. This research will conduct an entrepreneurial university survey by OECD and European Compassion, which will be translated into Arabic and distributed electronically to employees of Jouf University. The total number of employees at Jouf University is around 2 thousand, and approximately 89 have administrative mandates in the University in 2022; an electronic survey was sent to them twice during 2022 and received 54 respondents (61% respondent rate). The main reason for choosing employees who have administrative mandates is their contribution and role in developing entrepreneurial characteristics in the University.

3.3. Data Analysis

The questionnaire is designed to measure entrepreneurial universities in seven different areas. Each area is examined based on at least five statements, and each statement is evaluated on a scale from 1 to 10, where one means very weak and ten means very strong. Then, the average of each area measurement and the average of the sub-area are calculated to evaluate each area and the sub-area. The average value ranges between 0-10, where 0-2 indicates a significantly insufficient level, 3-4 indicates a slightly insufficient level, 5-6 indicates an average level, 7-8 indicates a sufficient level, and 9-10 indicates a significantly sufficient level. Table 1 illustrates the conceptual and empirical framework of this study. Accordingly, descriptive analysis is presented for each EU characteristic; then, factor analysis is conducted to answer the main research questions.

4. Results

4.1. Entrepreneurial Characteristics at Jouf University

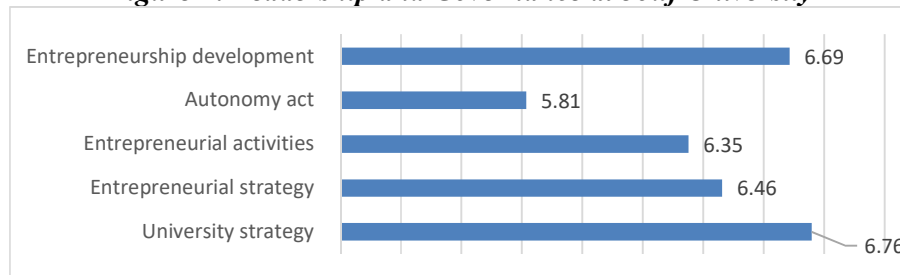
4.1.1. Leadership and Governance at Jouf University

Leadership and governance (LG) is the first component in the EU framework, which can be measured based on five sub-measures, as illustrated in Figure 2. These include university strategy, entrepreneurial strategy, entrepreneurial activities, autonomy act, and entrepreneurship development. First, regarding university strategy, results show that entrepreneurship is considered a significant part of the university strategy, as the average was 6.76, which indicates a slightly high sufficient level. Second, the average entrepreneurial strategy is 6.46, which indicates the average level, meaning the University needs to be more committed to implementing entrepreneurial strategy at a high level.

Third, the University needs to develop a model for coordinating and integrating entrepreneurial activities at all levels, as the average is 6.35, which indicates the average level. Fourth, autonomy to act in the University's faculties and units needs to be considered more, as the level is average since it scored 5.81. Finally, entrepreneurship development needs to be improved at Jouf University, as the average of entrepreneurship development in the wide regional, social, and community is 6.69.

Accordingly, these measures range between average and slightly sufficient levels, yet further enhancement is required to develop the entrepreneurial characteristics at Jouf University. This enhancement can be considered in integrating entrepreneurial activities at all levels of the University, in addition to the autonomy to act in university faculties, which might require giving more authority to these faculties and decreasing bureaucracy in the University.

Figure 2: Leadership and Governance at Jouf University



4.1.2. Organizational capacity, people, and incentives at Jouf University

The second component of the EU framework is the organizational capacity, people, and incentives (OCPI), which can be measured based on seven different measurements, and these include funding and investment, financial strategy, internal stakeholders, entrepreneurial attitudes and behaviors engagement, staff development, incentives and rewards, and stakeholders' recognition. Figure 3 illustrates the average of the sub-measurements, as all these are performed on average, which means further development is required. First, funding and investment: Jouf University needs to diversify funding resources and investment to support the entrepreneurial objectives of the University. Second, universities must have a sustainable financial strategy to support entrepreneurial development. Third, the University needs mechanisms for fostering new relationships and bringing internal stakeholders

together (staff and students) to build synergies between them. In addition, the University needs to recruit and engage with individuals with entrepreneurial attitudes, behaviors, and experience. Furthermore, Jouf University must invest more in staff development to support its entrepreneurial agenda. There must be incentives and rewards for staff actively supporting the University's entrepreneurial agenda. Finally, Jouf University needs to give more status and recognition to other stakeholders who contribute to the University's entrepreneurial agenda.

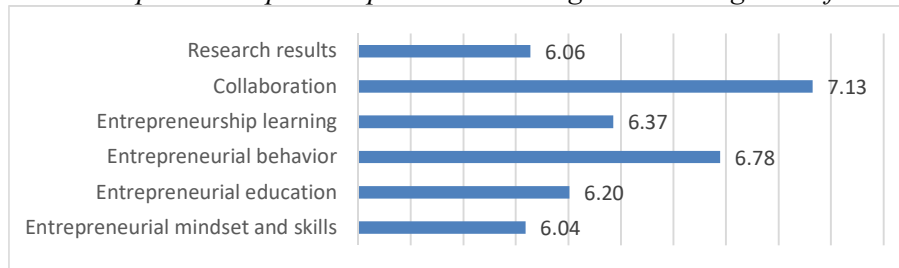
Figure 3: Organizational capacity, people, and incentives at Jouf University



4.1.3. Entrepreneurship development in teaching and learning

The third component in the EU framework is entrepreneurship development in teaching and education, which can be measured based on six sub-measurements. These include research results, collaboration, entrepreneurship learning, entrepreneurial behavior, entrepreneurial education, and entrepreneurial mindset and skills, as collaboration and entrepreneurial behavior perform sufficiently, whereas others perform averagely. Accordingly, several enhancements must be considered to develop this area at Jouf University. This means the University must create awareness and stimulating ideas, collaborate and engage with external stakeholders, and integrate research results to develop entrepreneurship in teaching and learning. Figure 4 illustrates entrepreneurship development in teaching and learning at Jouf University for more detail regarding the sub-measurements.

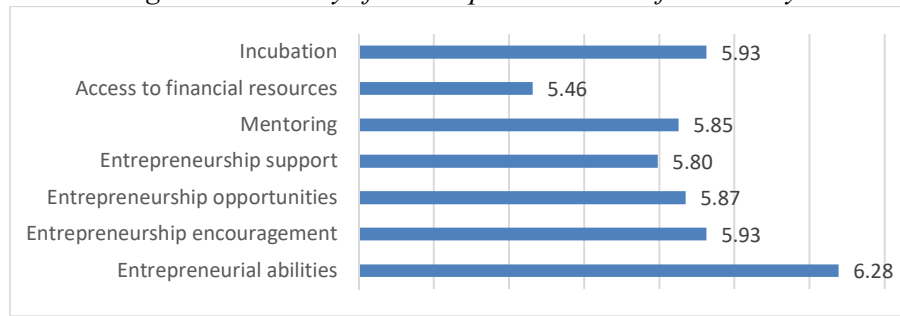
Figure 4: Entrepreneurship development in teaching and learning at Jouf University



4.1.4. Pathways for entrepreneurs

The fourth component in the EU framework is pathways for entrepreneurs that can be measured based on seven sub-measures. These include incubation, financial resource access, mentoring, support, opportunities, encouragement, and abilities, as the last performed averagely in Jouf University requires further development. First, the University needs to raise more awareness regarding the development of entrepreneurial abilities among staff and students. In addition, the University must encourage individuals to become entrepreneurial, providing entrepreneurial opportunities and support to act toward entrepreneurial ideas. This support can be seen in providing mentoring by academic and industry personnel, in addition to financial resources access and incubation support. For more details regarding the sub-measures of this area, see Figure 5.

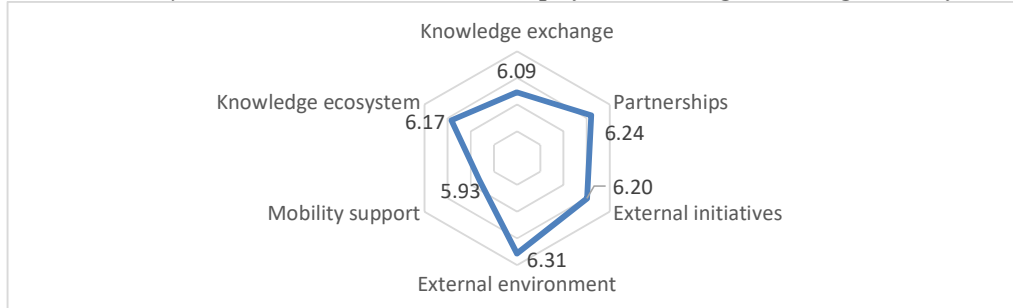
Figure 5: Pathways for entrepreneurs in Jouf University



4.1.5. University-business external relationships for knowledge exchange

The fifth component is external relationships for knowledge exchange that can be measured based on six sub-measurements: knowledge exchange, partnerships, external initiatives, external environment, mobility support, and knowledge ecosystem. All the sub-measures in this area perform average, meaning further development is needed. This can be in committing more to collaboration with industry and a wide range of stakeholders to support knowledge exchange in addition to providing opportunities for staff and students to be more involved in entrepreneurial activities within the external environment, where more support for student and staff mobility between academia and the external environment needs to be taken into consideration more. Finally, the University must link research, education, and industry (wider community) activities to affect the whole knowledge ecosystem and develop entrepreneurship in the University and the region. Figure 6 illustrates the sub-measurements of external relationships between the University and business for knowledge exchange at Jouf University.

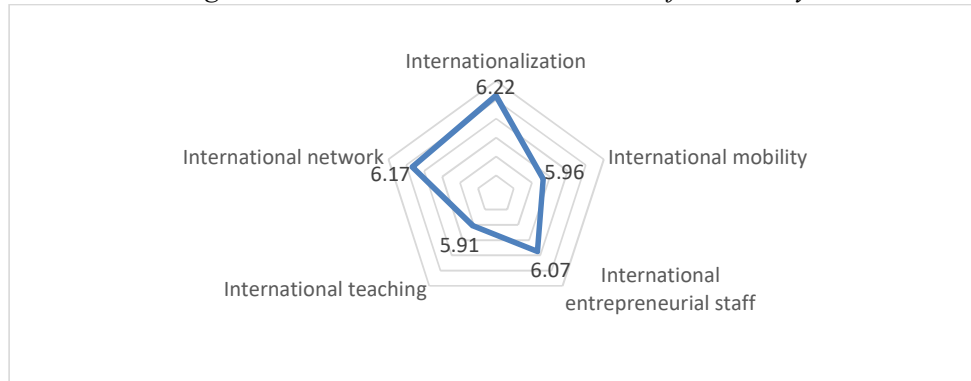
Figure 6: University-business external relationships for knowledge exchange at Jouf University



4.1.6. International institution

Another component in the EU framework is the international institutions that can be measured based on five sub-measures: internationalization, international mobility, international entrepreneurial staff, international teaching, and international networks. All the sub-measures above perform average; for more details, see Figure 7, an international institution in Jouf University. Therefore, the University needs to develop this area by moving forward to internationalization in teaching and networking, as it needs to attract international entrepreneurial staff and support the international mobility of students and staff.

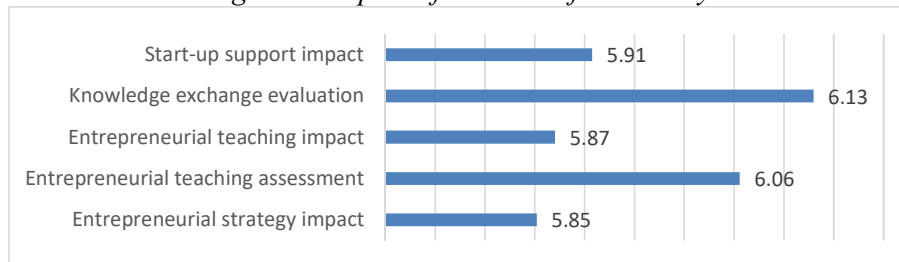
Figure 7: International institution in Jouf University



4.1.7. Impact of Entrepreneurial University

The final component of the EU framework is the impact of the EU, which can be measured based on five different sub-measures. These include start-up support impact, knowledge exchange evaluation, entrepreneurial teaching impact and assessment, and entrepreneurial strategy impact, as these performed averagely, meaning further development is needed. Development in entrepreneurial strategy impacts that need to be considered more in the University, in addition to assessing the engagement level in entrepreneurial teaching and learning. Moreover, the University needs to assess knowledge exchange and start-up support regularly. For more details, see Figure 8, the impact of the EU at Jouf University.

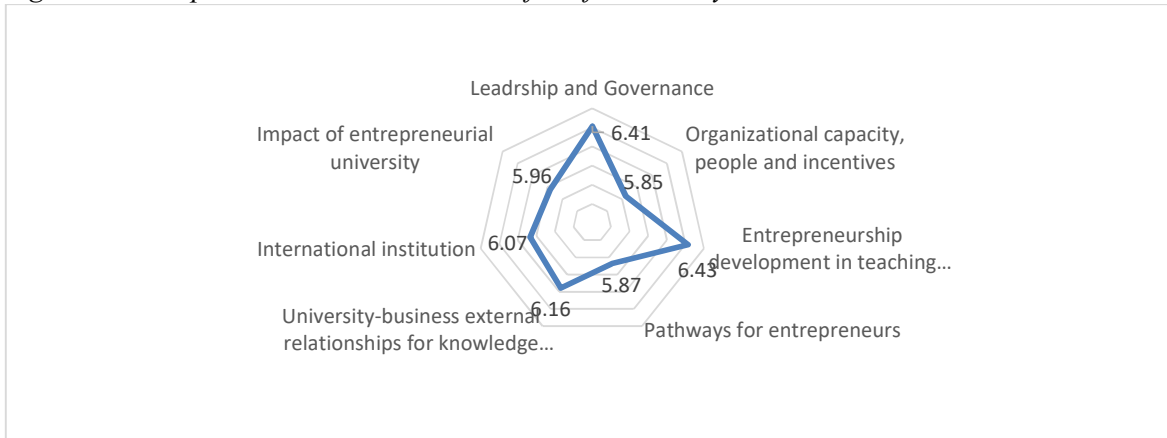
Figure 8: Impact of EU at Jouf University



4.1.8. Entrepreneurial Characteristics in Jouf University

In general, the EU characteristics in Jouf University performed averagely, as the average for leadership and government is 6.41, the average for organizational capacity is 5.85, the average for entrepreneurship development in teaching and learning is 6.43, the average for pathways for entrepreneurs is 5.87, the average for university-business relationships for knowledge exchange is 6.16, the average for international institutions is 6.07, and the average for the impact of the EU is 5.96. Figure 9 illustrates the entrepreneurial characteristics of Jouf University. This means further and serious development is required, as explained in the following section.

Figure 9: Entrepreneurial characteristics of Jouf University



4.2. Recommendations for Improving Entrepreneurial Characteristics in Jouf University

Figure 10 illustrates the entrepreneurial characteristics of Jouf University, as all performed on an average level, meaning further enhancements are required for each to transform into an entrepreneurial university. All sub-measurements were sorted from highest to lowest score, as all sub-measurements performed between slightly sufficient and average, presented in Table 2. These enhancements can be seen as follows:

First, five sub-measurements of entrepreneurial pathways must be developed: entrepreneurship encouragement, opportunities, support, mentoring, and access to financial resources. This means that Jouf University needs to encourage individuals to become entrepreneurial, whether from the faculty or society. This can be achieved by providing opportunities to experience entrepreneurship, supporting individuals and groups to move from entrepreneurial ideas to action, and providing mentoring from academia and industry, as all this support needs to be considered as services in incubation facilities. Therefore, JU needs to consider adopting and developing incubation programs that enable entrepreneurs to access different types of resources and support to apply and test their entrepreneurial ideas to actual projects.

Second, three sub-measurements of EU impact need to be enhanced: entrepreneurial strategy impact, entrepreneurial teaching impact, and start-up support impact. Accordingly, to strengthen JU's entrepreneurial characteristics, the EU's impact needs to be considered, meaning the University needs to assess the impact of entrepreneurial strategy, entrepreneurial teaching, and start-up support.

Third, three sub-measures need to be considered for developing organizational capacity, people, and incentives: financial strategy, staff development, and stakeholders' recognition. Accordingly, JU needs to invest more in staff development to support the entrepreneurial agenda, as it needs to have a sustainable financial strategy to support entrepreneurial development and recognize other stakeholders who contribute to this agenda.

Fourth: Two sub-measurements regarding international institutions need to be enhanced. These are international mobility and international entrepreneurial staff. Accordingly, JU needs to support the international mobility of its staff and students and seek and attract international and entrepreneurial staff to develop the EU characteristics and thus develop entrepreneurship.

Fifth: JU must support staff and student mobility between academia and the external environment to develop external relationships between the University and business for knowledge exchange.

Finally, JU needs to consider autonomy in the faculties and units, as it considers autonomy in leadership and governance to be one of a university's entrepreneurial characteristics.

These are the weakest areas in JU that need to be enhanced the most, yet further enhancements are needed to develop the sufficiency level of other components in the EU. For example, JU needs to be more committed at a high level to implementing the entrepreneurial strategy and needs to have a model for coordinating and integrating entrepreneurial activities at all levels across the University, as it needs to focus on encouraging entrepreneurial activities by providing financial support and

investment from internal and external stakeholders. This cannot be achieved without developing the mindset and abilities on how to be an entrepreneur to JU faculty and students and encouraging them to be an entrepreneur to transform their entrepreneurial ideas into action, and thus enable knowledge exchange by benefiting from the university network on national and international levels, and this might help to emphasize the impact of EU.

Accordingly, the EU has different characteristics that can emphasize its impact on entrepreneurial strategy, teaching, knowledge exchange, and start-up support. These characteristics interact in complex ways and can be related to other characteristics; thus, developing one area of the EU characteristics might strengthen the EU impact. Accordingly, a factor analysis was conducted to determine the factors most related to the EU's impact, explained in the following section.

Figure 10: Entrepreneurial Characteristics of Jouf University

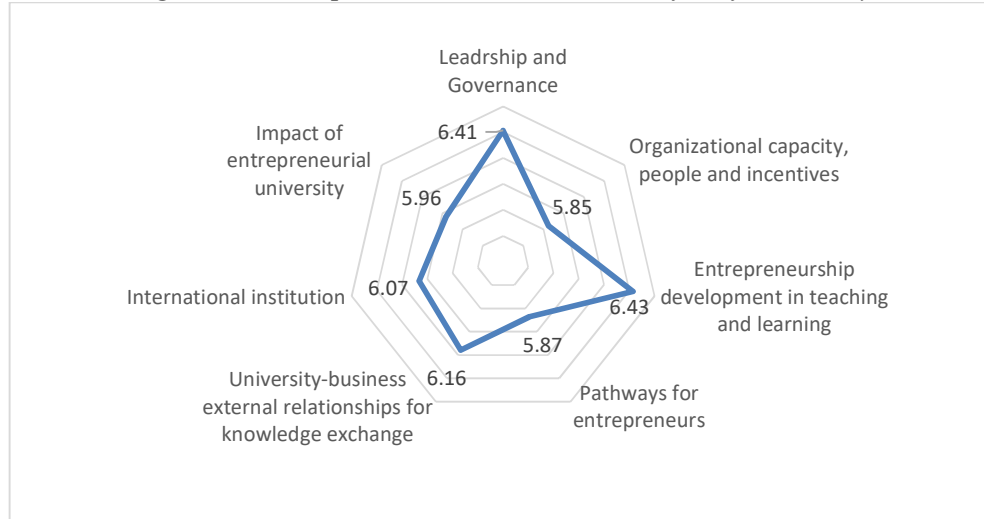


Table 2: Sub-measurements of EU characteristics in JU

Performance level	Sub-measurement	EU characteristic	Score
Slightly sufficient	Collaboration	Entrepreneurship development in teaching and learning	7.13
	Entrepreneurial behavior		6.78
	University Strategy	Leadership and Governance	6.76
	Entrepreneurship development		6.69
	Funding and investment	Organizational capacity, people, and incentives	6.48
	Entrepreneurial strategy	Leadership and Governance	6.46
	Entrepreneurship learning	Entrepreneurship development in teaching and learning	6.37
	Entrepreneurial activities	Leadership and Governance	6.35
	External environment	University-business external relationships for knowledge exchange	6.31
	Entrepreneurial abilities	Pathways for entrepreneurs	6.28
	Partnerships	University-business external relationships for knowledge exchange	6.24
	Internationalization	International institution	6.22

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Performance level	Sub-measurement	EU characteristic	Score
	Entrepreneurial education	Entrepreneurship development in teaching and learning	6.20
Slightly Sufficient	External initiatives	University-business external relationships for knowledge exchange	6.20
	Knowledge ecosystem		6.17
	International network	International institution	6.17
	Knowledge exchange evaluation	Impact of EU	6.13
	Entrepreneurial attitudes and behavior engagement	Organizational capacity, people, and incentives	6.11
	Knowledge exchange	University-business external relationships for knowledge exchange	6.09
	International entrepreneurial staff	International institution	6.07
	Research results	Entrepreneurship development in teaching and learning	6.06
	Entrepreneurial teaching assessment	Impact of EU	6.06
	Entrepreneurial mindset and skills	Entrepreneurship development in teaching and learning	6.04
	Internal stakeholders	Organizational capacity, people, and incentives	6.02
Average Level	International mobility	International institution	5.96
	Entrepreneurship encouragement	Pathways for entrepreneurs	5.93
	Incubation		5.93
	Mobility support	University-business external relationships for knowledge exchange	5.93
	International teaching	International institution	5.91
	Start-up support impact	Impact of EU	5.91
	Entrepreneurship opportunities	Pathways for entrepreneurs	5.87
	Entrepreneurial teaching impact	Impact of EU	5.87
	Mentoring	Pathways for entrepreneurs	5.85
	Entrepreneurial strategy impact	Impact of EU	5.85
	Autonomy act	Leadership and governance	5.81
	Staff development	Organizational capacity, people and incentives	5.81
	Entrepreneurship support	Pathways for entrepreneurs	5.80
	Financial strategy	Organizational capacity, people and incentives	5.69
	Stakeholders' recognition		5.65

Performance level	Sub-measurement	EU characteristic	Score
	Access to financial resources	Pathways for entrepreneurs	5.46
	Incentives and rewards	Organizational capacity, people and incentives	5.19

4.3. Relationship between EU Characteristics and the impact of EU in Jouf University

A normality test was conducted on all variables, as all these variables are normally distributed. Table 3 illustrates normality tests of all variables, where LG is leadership and governance average, OCPI is Organisational capacity, people and incentives average, EDTL is entrepreneurship development in teaching and learning, PE is pathways for entrepreneurs average, KE is the average of university-business external relationships for knowledge exchange, Inter is average of international institution, and EUI is the impact of EU. The main assumption of the normality test can be accepted when the significant value is less than .05. Thus, all variables are normally distributed, as shown in Table 3.

Table 3: Normality tests

	Shapiro-Wilk		
	Statistic	df	Sig.
LG	.929	54	.003
OCPI	.938	54	.008
EDTL	.904	54	<.001
PE	.917	54	.001
KE	.922	54	.002
Inter	.929	54	.003
EUI	.931	54	.004

Accordingly, to quantify the relationship between EU characteristics and the impact of the EU on Jouf University, the study conducted the Pearson correlation test, which measures the linear association between two variables and has a value between -1 and 1. Value (-1) indicates a perfectly negative linear correlation, (0) indicates no linear correlation, and (1) indicates a perfectly positive correlation. Table 4 shows the Pearson correlation test, as it represents a strong correlation between all EU characteristics and the impact of the EU, as they range between 0.8 and 0.9, where international institution (Intre) is the most related positively. Pathways for entrepreneurs (PE) is the least among all EU characteristics. In addition, the EU characteristics are strongly correlated, as the values range between 0.8 and 0.9, which means that developing one characteristic can enhance and develop others and increase the influence of the EU.

To explain, having an international environment regarding teaching, training, research and entrepreneurial activities can be achieved by encouraging spin-off and collaboration with industry for knowledge exchange (KE), promoting innovation and stimulating ideas by developing entrepreneurship teaching and learning (EDTL), and having the organizational capacity, people and incentives (OCPI) to support entrepreneurial agenda and consider it on the strategic level by the leadership and governance (LG). As all characteristics are related, developing one will develop others.

Table 4: Pearson correlation test

Correlation Matrix								
		LG	OCPI	EDTL	PE	KE	Inter	EUI
Correlation	LG	1.000						
	OCPI	.903	1.000					
	EDTL	.908	.929	1.000				
	PE	.836	.936	.907	1.000			
	KE	.889	.928	.945	.940	1.000		
	Inter	.862	.862	.888	.837	.921	1.000	
	EUI	.901	.873	.904	.852	.929	.962	1.000

5. Discussion

Since the EU can be defined and measured based on seven characteristics, the result of each area can provide insight into the progress of the transformation of the EU, and it can be used in forming a strategic plan to develop the weak areas (EU-OECD, 2022). In general, the EU characteristics in Jouf University performed averagely, where further enhancements are required to increase their impact regarding entrepreneurial teaching, knowledge exchange, and start-up support. Since all EU characteristics and EU impact are strongly related, developing one element can influence others significantly.

According to the suggested paradigm by Alghamdi (2020) to help Saudi universities transform into the EU, Jouf University is between the first and second stages; these are adopting the idea of the EU and experimental application. This means that on the strategic level, where the entrepreneurial agenda is considered to develop and change the environment that encourages entrepreneurial activities at Jouf University, further enhancement is required to increase the impact regarding knowledge exchange, entrepreneurial teaching, and start-up support. Accordingly, Jouf University needs to ensure that the EU aspects are applied, starting with strategy and initiatives and assessing the progress of transforming into the EU according to the new system.

The next stage is the implementation of the seven dimensions of EU at Jouf University, where all leaders, faculty, staff, and students need to be involved. The implementation needs to be conducted in stages on a minor scale, such as a particular college. Then, based on the results, the implementation can be widened to other colleges and units. In line with this step, identifying training needs for the key players in line with EU requirements and spreading and promoting entrepreneurial culture are necessary. Assessing and evaluating the implantation stage is necessary and must be continuous.

By looking into the EU characteristics of Jouf University in detail, starting with leadership and governance, entrepreneurship is considered a significant part of the University's strategy. However, the University must implement a supportive strategy at the highest level to integrate entrepreneurial activities at all levels. However, the University can face many challenges in its entrepreneurial journey. These challenges can be seen, for example, in bureaucracy, lack of support and resources, and lack of abilities. Accordingly, the University can assess these challenges in its strategy. This means that to be more entrepreneurial, the University needs to consider the following on the higher level "strategy":

- We have a financial strategy to support entrepreneurial activities.
- We are giving the faculties and units more authority to support entrepreneurial activities.
- It encourages collaborations with internal and external stakeholders to support knowledge exchange, especially with the industry.
- We are investing more in staff and student development, especially developing entrepreneurial abilities via incubation programs and entrepreneurship teaching and learning.

- We are giving more status and recognition to those who contribute to the University's entrepreneurial agenda from students, staff, and stakeholders.
- Supporting international mobility of students and staff and attracting international staff to develop research, teaching, and networking is essential for the University to attract international entrepreneurial staff and support international mobility of students and staff.
- Assessing knowledge exchange and start-up support regularly

Therefore, based on the analysis of the Jouf University case and recommendations of Alghamdi's (2020) paradigm, the strategy needs to consider developing all challenges of transforming into the EU. These include preparing and training critical players in the University, funding and financial resources, collaborations with stakeholders, and having an international environment. This strategy can be assessed and evaluated continuously to measure the impact on entrepreneurial teaching and learning, knowledge exchange, and start-up support. It is worth mentioning that developing one characteristic can influence others and significantly impact the EU since all characteristics and the impact are strongly related.

Having an entrepreneurial strategy can play a significant role in developing a supportive ecosystem in the University (Bischoff et al., 2018) and thus strengthen the economic and social impact of the EU. Since the EU is in the middle of the ecosystem and interacts with different stakeholders, in Jouf University's case, having a strategy of how the University can manage its stakeholders is a must to develop a supportive ecosystem and strengthen its economic and social role (Bischoff et al., 2018).

Since the EU is a player in the ecosystem that interacts with different stakeholders (Moussa et al., 2020) that influence entrepreneurship development (Radko et al., 2022), where each University is unique in what factors influence attitude toward entrepreneurship, Jouf University case staff development and having a financial strategy is a necessity to support knowledge capital. According to Audretsch and Belitski (2021), knowledge capital can be seen in inventions, applied research, and R&D, as these require entrepreneurial capital to commercialize them. Accordingly, to enhance this characteristic, staff development and having a financial strategy to fund and invest in entrepreneurial activities must be considered.

This means Jouf University is sufficient regarding developing entrepreneurial mindset and skills, entrepreneurial education, behavior, learning, collaboration, and research results that can promote innovation and stimulating ideas, which are considered essential components of the ecosystem that strengthen the economic and social role of the EU (Cerver Romero et al., 2021). Researchers' attitudes toward entrepreneurship need to be considered in the EU, as knowledge transfer between University and industry by encouraging researchers to participate in entrepreneurial activities (Rammer et al., 2009) to develop the ecosystem and the role of the EU.

Having an entrepreneurial strategy can play a significant role in developing a supportive ecosystem in the University (Bischoff et al., 2018) and thus strengthen the economic and social impact of the EU. Since the EU is in the middle of the ecosystem and interacts with different stakeholders, in Jouf University's case, having a strategy of how the University can manage its stakeholders is a must to develop a supportive ecosystem and thus entrepreneurship development and their economic and social role (Bischoff et al., 2018).

Interaction with the external environment to encourage knowledge spin-off, collaboration with industry, and commercialization of knowledge capital can help create a venture and develop a supportive strategy for the University to deal with the outcome of research and entrepreneurial activities (Cerver Romero et al., 2021), as in the Stanford University case (Etzkowitz et al., 2018). Jouf University needs to consider collaborations, join the research, and mobility of students and staff in their strategy to have a sustainable entrepreneurial model for the University, as this can benefit the knowledge and experience exchange development of students, staff, and entrepreneurs (Ketikidis et al., 2012).

EU can play a social and economic role by supporting spin-off creation, easing resource access, facilitating technology transformation, research orientation, entrepreneurial orientation, and market

hostility. Additionally, the EU can contribute significantly to the creation of spin-offs and long-term growth, which can be one of the most significant impacts of the EU socially and economically (Soetanto & Geenhuizen, 2019). This is because university spin-off companies are the main actors in the ecosystem and strengthen knowledge transfer by relating with other businesses beyond the University and ecosystem (Fuster et al., 2019). Accordingly, as all EU characteristics are related strongly to the impact of the EU in the Jouf University case, and since all these characteristics, as mentioned before, interact and develop the ecosystem, thus having an entrepreneurial strategy that considers developing all mentioned characteristics is a must. Table 5 summarises the strong performance and what areas need to be developed to be more entrepreneurial in the Jouf University case.

Table 5: Performance of EU Characteristics in Jouf University

EU characteristics	Strong performance	What needs to be developed
Entrepreneurship development in teaching and learning	Collaboration	
	Entrepreneurial behavior	
	Entrepreneurship learning	
	Entrepreneurial education	
	Research results	
	Entrepreneurial mindset and skills	
Leadership and governance	University strategy	Autonomy act
	Entrepreneurial strategy	
	Entrepreneurial activities	
University-business external relationships for knowledge exchange	External environment	Mobility support
	Partnerships	
	External initiatives	
	Knowledge ecosystem	
	Knowledge exchange	
Organizational capacity, people and incentives	Funding and investment	Staff development
	Entrepreneurial attitude and behavior engagement	Financial strategy
	Internal stakeholders	Stakeholders recognition
		Incentives and rewards
Pathways for entrepreneurs	Entrepreneurial abilities	Access to financial resources
		Mentoring
		Entrepreneurship encouragement
		Entrepreneurship opportunities
		Entrepreneurship support
		Incubation
International institution	Internationalization	International mobility
	International network	International teaching
Impact of EU	Knowledge exchange evaluation	Start-up support impact
	Entrepreneurial teaching assessment	Entrepreneurial teaching impact
		Entrepreneurial strategy impact

6. Conclusion

To conclude, this study aimed to address advancing entrepreneurial universities from the EU-OECD framework by providing empirical evidence of Jouf University. The study found that EU characteristics in Jouf University performed averagely, where further enhancements are required to increase their impact regarding entrepreneurial teaching, knowledge exchange, and start-up support. Since all EU characteristics and EU impact are firmly related, developing one element can influence others significantly. Accordingly, Jouf University must ensure that the EU aspects are applied, starting with strategy and initiatives and assessing the progress of transforming into the EU according to the new system.

This means implementing and evaluating the seven dimensions of EU in Jouf University, where all leaders, faculty, staff, and students must be involved. Jouf University can play a social and economic role by supporting spin-off creation, easing resource access, facilitating technology transformation, research orientation, entrepreneurial orientation, and market hostility. Additionally, Jouf University can contribute significantly to the creation of spin-offs and the long-term growth of the EU, which can be one of the most significant impacts on the EU socially and economically.

This study provides in-depth insight and analysis of how the EU-OECD framework can advance EU characteristics on emerging universities in Saudi Arabia, where other cases can apply and benefit. Further work needs to be assessed in this field, such as comparing developed and emerging universities in different countries and longitude regarding applying this framework and continuous evaluation of certain universities to address the progress and the main challenges. The world needs more entrepreneurial universities than traditional ones to have a social and economic impact, especially when transferring from a resources-based economy to a knowledge-based economy. Thus, further development by decision-makers and further studies in this field are significantly needed.

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