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# Towards an entrepreneurial university model: evidence from the Palestine Polytechnic University

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## Abstract

This study aims to introduce a proposed model for transforming the Palestine Polytechnic University (PPU) into an entrepreneurial university. Towards that end, a quantitative approach using statistical techniques of *t* test, ANOVA, Kruskal–Wallis test, and Pairwise comparisons supported by explanatory and qualitative discussions were utilized. The main findings show that the applicability of entrepreneurship at PPU was relatively fair for the aspects of the compatibility of curricula with the labor market needs, community relations and partnerships, academic exchange, entrepreneurship culture, entrepreneurial education, and university internationalization. Entrepreneurship as a policy objective was moderately acceptable for university policies and regulations, scientific research and innovation, and university leadership, but the university environment was less than moderate. The findings also show that the university leadership acknowledges the importance of achieving entrepreneurship, while they pay insufficient attention to the academic exchange. Offering other supportive funding resources can accelerate entrepreneurship. Given that, this study is likely to provide a proposed model to transform PPU into an entrepreneurial university and effectively achieve the university's pioneering vision that contributes to the university's development and presents this model to the decision makers.

**Keywords:** Entrepreneurship, Entrepreneurial university, Entrepreneurial education, PPU, Innovation, Funding

## Introduction

Today's world economy is going through a transition towards a new economic dynamic that includes rules and practices used to achieve success in the industry, they are completely different from those rules and practices used in the past. In the new economy, ideas and intellectual capital have replaced natural resources, and innovation mechanics have become the most important factors for economic development (Henrekson & Rosenberg, 2000). Quality of education moderates economic and political globalization to boost entrepreneurship. Policymakers are urged to undertake a context, where policies can turn globalization to enhance long-term entrepreneurship opportunities (Arshed et al., 2022).

In its broad concept, entrepreneurship has become one of the pressing issues that receive wide global attention, given the role it plays in economic and social development, in addition to its distinguished role in involving many societal segments in economic activity, specifically the youth segment, through the establishment of projects and their own business.

Entrepreneurship is one of the most important major means of restructuring any university that wants to be able to compete, evolve, and grow over time, coinciding with the balance between the university being a public institution and a means of marketing and entrepreneurship to maintain the fundamental values of the university's academic role (Fernández & Sáenz, 2018). Universities are usually seen as institutions that focus on academic education with a strong emphasis on theory-based learning. Moreover, some universities consider the entrepreneurial university as something that can be learned, while others consider it as an institution in which graduates can set up their projects. Meanwhile, some universities measure entrepreneurship through the ability to create job opportunities for their graduates, even though many other variables need to consider for that end, i.e., traineeships, elective courses, conferences, workshops, faculty and students exchange, etc.

In light of Palestinian universities' financial pressures to become self-sufficient, the speed of the growing economy and its requirements may negatively affect Palestinian universities' missions and visions. Thus, a need was required to propose a new model for transforming traditional Palestinian universities into entrepreneurial universities, since it is the key to accessing the knowledge economy and its role in solving the financial aspect and enhancing the development of society economically (Etzkowitz, 2006). The Palestine Polytechnic University (PPU) is considered one of the Palestinian universities striving to be an entrepreneurial university in its educational and administrative aspects. It faces several crises and obstacles, including financial support, due to the occupation policies based on withholding support and its restrictions on the government and the higher education sector. It is a Palestinian university that has a good reputation in entrepreneurship. (Palestine Polytechnic University site, 2017). From this standpoint, this study is prepared to address this issue because of its importance and value for developing an entrepreneurial university by proposing a model for transforming the university into an entrepreneurial university, as a case study for Palestine Polytechnic University.

The growing demand for higher education leads to the need to present a model for entrepreneurial Palestinian universities in line with the entrepreneurship of the leading European universities. Accordingly, the study's research gap is determined by the absence of a precise term for entrepreneurship at both the academic and administrative levels. In particular, there is a misunderstanding of the characteristics and pillars of an entrepreneurial university's conceptualization. On the other hand, there is no unified model for the entrepreneurial concept, characteristics, and items between universities (Interview with the senior university administration, 2019). Furthermore, such a proposed model can be adopted as a transformative model for other Palestinian universities. Therefore, this study formulated three specific questions for proposing an entrepreneurial model for the PPU as shown below:

- What is the reality of entrepreneurship at the PPU from the viewpoint of senior and middle management?
- What are the requirements to transform the PPU into an entrepreneurial university from the senior and middle management perspective?
- Are there any potential differences between the study population's responses on their assessment of the entrepreneurial university availability at the PPU attributed to work experience and position?

### **Literature review and policy environment**

Etzkowitz (2003) defines the entrepreneurial university (EU) as the natural incubator that provides the faculty and students with a supportive structure to start new intellectual and commercial projects by creating multiple knowledge, scientific fields, and new complementary industrial sectors. Salem (2014) defined the EU concept as a university that provides environments, cultures, practices, and opportunities to foster entrepreneurship among workers, students, and alumni. The university possesses a wide range of mechanisms to promote entrepreneurship. These mechanisms include entrepreneurship courses, organizational restructuring of the university to allow effective promotion of entrepreneurship among students and the faculty, and a comprehensive internal system for the marketing of knowledge produced. This would also include technology transfer offices and research budgets to meet public and private sector requirements, and consulting services, which contribute to creating companies for students (Jacob et al., 2003). It is also known as the university that actively identifies and invests opportunities in research and education to develop itself, transferring knowledge to the surrounding community through the interaction between the university, government, and industry. Hence, these steps will meet the knowledge economy's requirements, strengthen the national economy, and keep pace with global developments (Sam & van der Sijde, 2014). Industry experience and academic qualifications are significant determinants of faculty proactivity. This is insightful for policymakers in Kuwaiti educational institutions. In particular, entrepreneurial engagement for faculty is no less important than establishing internationally accredited schools (Abidi et al., 2022).

Abu Labhan (2018) defines the EU as the university that adopts a comprehensive approach to achieve economic and social development at the national and regional levels by preparing a generation of entrepreneurs with work opportunities. This achievement requires an entrepreneurial spirit that encourages the investment of opportunities and ideas in various fields, which is conducted by translating such opportunities into business through managing and investing resources in cooperation with various internal and external stakeholders. Guerrero & Urbano (2010) defined the EU as a university that meets the community and market needs by developing organizational potential, innovation, creativity, and creating opportunities while considering risks that may occur. Al-Hajjar (2018) defined it as the university, which provides innovative programs and services in teaching, scientific research, and community service. It occupies a unique place among universities and can absorb or predict risks and invest in them as positive opportunities. It is always a leader in every progress and development felt by workers, beneficiaries, and society. Abdel Wahab (2018) defined the EU as the university that has

succeeded through practical paths in shifting from the traditional university-style related to education and research to another style that gives non-traditional attention to integrating university jobs from education and scientific research and community service to play a significant role in supporting the system of innovation and entrepreneurship and contributing to economic and social development and providing the requirements of the knowledge economy By investing in innovative knowledge. Furthermore, Amofah and Saladríguez (2022) examined the role of gender on entrepreneurial education and role models or parental self-employment, by carrying out a multi-group analysis. The authors recommended the institutionalization of traineeships, elective courses, conferences, and workshops on entrepreneurship to boost the entrepreneurial spirit of students.

According to Isenberg (2011), an entrepreneurial ecosystem consists of elements grouped into six domains: conducive culture, facilitating policies and leadership, availability of dedicated finance, relevant human capital, venture-friendly markets for products, and a broad institutional set and infrastructural supports. Rice et al. (2014) indicated that the university should have a university-based Entrepreneurship ecosystem to be considered an entrepreneurial one. Nicotra et al. (2018) defined the entrepreneurial ecosystem as the combination of social, political, economic, and cultural elements in a region that supports the development and growth of innovative startups and encourages new entrepreneurs and other actors to take the risk of starting, funding, and in other ways helping high-risk businesses.

Fernández et al. (2018) say that: “Most universities perform entrepreneurial activities, but not all of them can be defined as entrepreneurial universities.” However, the EU is the university that influences economic development and economic growth through its entrepreneurial activities that depend on technological development and is concerned and interested in research, the development of research abilities, and the transformation of technology (Zhou & Peng, 2008). Entrepreneurial education not only affects entrepreneurial goal intentions and other entrepreneurial traits but even entrepreneurship education influences entrepreneurship development (Ndofirepi, 2020). From the researchers’ point of view, as aforesaid, the entrepreneurial university can be defined as the university that works with unremitting steps towards being distinguished in all its strategic, organizational, educational, humanities, environmental, and financial levels. Consequently, it can also include university curriculums, scientific research, and entrepreneurial education to achieve projects and applied research to address the local community’s problems. The university’s role expands to providing knowledge and making and transferring the knowledge locally and internationally for creating jobs in favor of graduates rather than just employment.

### **The triple, quadrable, and quintuple helix innovation model**

The triple helix innovation model focuses on the networks and relationships among universities, industry, and government. The quadruple helix innovation systems bring in the perspectives of the media-based and the culture-based public as well as that of civil society. The quintuple helix emphasizes the natural environments of society, also for knowledge production and innovation (Carayannis & Campbell, 2011). Accordingly, the triple helix is the core model for innovation, arising from interchanges in knowledge production involving higher education institutions, the economy, and governments

that contain the stakeholders. Local society including media and culture was considered by the broader innovation model of the quadruple (Carayannis & Rakhmatullin, 2014). The quintuple helix model makes it clear that the implementation of thought and action in sustainability will have a positive impact on society at large (Carayannis et al., 2012). During this study, the quintuple helix of the innovation model, including government, university, industry, society, and environment are taken into account for developing the variables of the study model. The government, university, industry, society, and environment are taken into account.

### **Entrepreneurial university indicators**

Entrepreneurship education courses contribute to improving students' entrepreneurial skills. The impact of entrepreneurship education in compulsory courses is contingent on students' perceptions of parents' performance as entrepreneurs (Hahn et al., 2020). The Organization for Economic Co-operation and Development (OECD) has designed a framework for the universities concerned with strategic planning and decision-making that seek advice, guidance, and inspiration for the effective management of higher education institutions. It is designed for universities interested in self-assessment to keep pace with universities' development and reach the required levels. The OECD (2012) pointed out that the framework factors are dedicated as follows:

- Leadership and governance;
- Organizational capacity, people, and incentives;
- Entrepreneurship development in teaching and learning;
- Pathways for entrepreneurs; and
- University—business/external relationships for knowledge exchange.

Some universities focus on fostering entrepreneurial education, while others believe that entrepreneurship can be achieved through applying for teamwork, besides various business-related ideas, cultures, and visions. Furthermore, other universities consider that the entrepreneurial university is achieved through a set of skills and beliefs that need to be acquired through practice and experimentation, such as business development, market analysis, and customer engagement. (Huayller et al., 2014). Abu labhan (2018) suggested a proposed model for strengthening the implementation of entrepreneurial universities criteria which consist of: leadership and governance, organizational ability, entrepreneurial teaching and learning, supporting entrepreneurs, sharing and exchanging knowledge, internationalization, and institutional impact measurement. Whereas, Al-Shammari (2010) indicated that there are five requirements for the transformation into an entrepreneurial university as shown below:

- Transforming the university's role from a focus on employment to focusing on job creation;
- True partnership with stakeholders from public and private sectors and graduates
- Technology and knowledge transfer;
- Education based on creativity and innovation; and
- Leadership capable of providing material and moral capabilities to entrepreneurs.

In the same context, other studies dealt with the subject of an entrepreneurial university requirement, such as (Al-Sirr, 2017) recommended the necessity of concerning the culture of entrepreneurship at Palestinian universities in the Gaza strip, besides, providing an entrepreneurial environment that supports innovation, creativity, excellence, and achievements. Whereas the study (Haboush, 2017) also recommended developing special courses for entrepreneurship, developing courses and curricula for entrepreneurship, and the need for the university to pay attention to scientific research and link it with the labor market.

Based on the previous entrepreneurial university models for both OECD (2012) and Abu labhan (2018), taking into account the findings and recommendations for other related studies, such as Al-Sirr (2017), Haboush (2017), and Al-Shammari (2010). The requirements for achieving the entrepreneurial university that this study derived are curriculum, which meets labor market needs, entrepreneurial education, university's policies and regulations, university leadership, the culture of entrepreneurship, scientific research and innovations, community relations and partnerships, university environment, academic exchange, and university internationalization. This study, therefore, adopts the entrepreneurial framework of the OECD (2012) and Abu labhan (2018) model as they agree about universities' entrepreneurship requirements.

#### **The PPU's achievements in entrepreneurial activities**

Despite the challenges related to the occupation procedures that still put obstacles to achieving constructive communication, the PPU still opens horizons of cooperation with many international institutions, whether in Europe or America. Simultaneously, many researchers and academics participated in many international academic and research exchange programs and cooperation with prestigious research centers and universities. To enhance the competitiveness of the PPU, it focused on the student exchange programs as possible. On the other hand, the university continues to build on its accumulated achievements by serving its society, which distinguished it from similar national institutions. Moreover, it continues to enhance the service departments' efficiency and the excellence of the services they provide. In addition to the endeavor to achieve integration between the various axes that the university is working on, and achieve its strategy towards enhancing the competitiveness of the university (Palestine Polytechnic University site, 2017).

It is worth saying that despite the lack of national financial support for scientific research activities, researchers have managed to win support for their research projects from international and regional funds. In the year 2019, the value of the funded research projects exceeded one million dollars, which was accompanied by an increase in scientific publishing for researchers and specialized research centers (Palestine Polytechnic University site, 2017).

#### **Methodology**

The study undertakes a quantitative-exploratory approach using statistical techniques of *t* test, ANOVA, Kruskal–Wallis test, and Pairwise comparisons supported by qualitative discussions. It is also considered an exploratory methodology that investigates the entrepreneurship phenomenon at the university to explore the requirements to transform the



university into an entrepreneurial institution. After reviewing the literature review from previous studies, a questionnaire was designed to collect the data, which was processed and analyzed. Furthermore, an interview was conducted to explain some facts about the reality of entrepreneurship at the PPU.

#### **Population, sampling, and data collection**

The target population of this study consists of senior and middle management employees at the Palestine Polytechnic University, whose total number was (38). The categories of employees who participated in the study are the President, Vice presidents, Deans, Heads of Academic Departments, Directors of relevant Administrative Departments, and Managers of relevant Centers. As the study sample has undertaken the whole study population, Table 1 describes the study population in detail.

The primary data were collected through a questionnaire and an interview. The questionnaire was developed based on the literature review and previous studies that were then presented to arbitrators, who offered their remarks and suggestions that helped the researchers better develop the questionnaire to serve the purposes for which it was designed. In contrast, the secondary sources relied on previous studies and other literature, such as books, theses, articles, periodicals, and online articles related to universities' transformation towards entrepreneurship.

At the time of distributing the questionnaires, in-person interviews were conducted with employees in the senior and middle management at the university to enhance the results' discussion. All 38 distributed questionnaires were received back from the respondents, and all of them were valid for the statistical analysis. Another interview was conducted with the PPU president to ensure no inconsistencies in the questionnaire's answers.

#### **Study operational variables**

The *Independent Variables* are the Curricula, entrepreneurial education, policies and systems, university leadership, the culture of entrepreneurship, scientific research and innovation, community relations and partnerships, university environment, academic exchange, and university internationalization. The *Moderate Variables* are years of experience and current position. The *Dependent variable* is the Entrepreneurial university, characterized by creativity, innovation, good reputation, and startups established through its innovative graduated students.

#### **Validity of the study tool**

Concerning the *Context validity*, an academic supervisor and specialists in the study field have checked the validity of the questionnaire. They stated that the questionnaire is valid and appropriate to achieve the purpose of the study. While the *Structural validity* shows a high internal consistency between paragraphs in the questionnaire, as shown in Table 2, the instrument is suitable for performing the intended measurement.

**Table 1** List of targeted departments and centers of the study population

No	Category	Category Name
	Presidents	President
	Vice Presidents	Academic Affairs Administrative Affairs Planning Affairs Community Services
	Deans	Registration and Admission Scientific Research Students Affairs Faculty of Engineering Faculty of IT and Computer Engineering Faculty of Applied Science Faculty of Administrative Science and Informatics Faculty of Applied Professions
	Heads of Academic Departments	Mechanical Engineering Department Electrical Engineering Department Civil and Architectural Engineering Department Mathematics Department Computer Engineering Department Computer Science and IT Department Chemistry Department Administrative Science Department Information System and Multimedia Department Civil and Architectural Engineering Professions Department Mechanical and Electrical Engineering Professions Department Administrative Sciences Department Computer and Information Technology Department Banking and Finance Department
	Directors of Administrative Departments	Technical Consultancy Department Quality Assurance Department Public Relation Department
	Managers of Centers	Language and Translation center Computer Center Biotechnology Research Center Excellence in teaching and learning Center Continuous Education Center Stone and Marble Center Industrial Synergy Center Occupational Safety and Health Center

## Results

This important section focuses on the study findings with discussions and interpretations. However, Table 3 describes the means and standard deviations, sorted in descending order according to the mean values, of the total degrees of the themes of entrepreneurship at PPU.

The results showed that the levels of the curriculum and the labor market, community relations and partnerships, the academic exchange, the culture of entrepreneurship, and the entrepreneurial education themes are high. However, the levels of



**Table 2** Pearson correlations between questionnaire's sections and total degree

Section's Number	Section's title	Pearson correlation	Sig
1	The curriculum and the labor market	0.550**	0.002
2	Entrepreneurial education	0.635**	0.000
3	University regulations and polices	0.909**	0.000
4	University leadership	0.803**	0.000
5	The culture of entrepreneurship	0.769**	0.000
6	Scientific researches and innovations	0.916**	0.000
7	Community relations and partnerships	0.808**	0.000
8	University environment	0.821**	0.000
9	The academic exchange	0.797**	0.000
10	The university internationalization	0.930**	0.000

**Table 3** Means and Std. deviations of the reality of entrepreneurship at PPU

Section Number	Title	Mean	Level	Std. Deviation
1	Curriculum and the Labor Market	3.8682	High	0.52700
2	Community Relations and Partnerships	3.8600	High	0.65925
3	Academic Exchange	3.7095	High	0.72532
4	The Culture of Entrepreneurship	3.6639	High	0.57329
5	Entrepreneurial Education	3.6160	High	0.61301
6	The university's internationalization	3.4282	High	0.63861
7	University's polices and regulations	3.3684	Moderate	0.83552
8	Scientific researches and innovations	3.3031	Moderate	0.64427
9	University's leadership	3.2939	Moderate	0.85656
10	University's environment	3.1696	Moderate	0.63513

themes regarding the university's internationalization, regulations, and policies, scientific research and innovations, leadership, and the environment are moderate. This can be seen from the table above.

By answering the question regarding the reality of entrepreneurship at PPU from the senior and middle management perspective, the researcher believes that the highest mean emerged in the curriculum and labor market theme which was (3.8). This result needs PPU to recognize that this theme has the greatest importance in the university's priorities to be an entrepreneurial university. Therefore, the university needs to pay attention to developing curricula that are compatible with the labor market needs due to their significant impact on the university's entrepreneurship and development. The analysis showed that the university pays specific attention to its relations and partnership with the community segments. As a result, these relations affect positively the university's reputation and help to increase the university's finance by constructing many campuses and a new building that benefits the university, students, and staff.

As for the entrepreneurial education theme, the researcher believes that it has high attention at PPU, because the university strives to do the best possible in education to maintain certain objectives. Moreover, most of the lecturers attempt to use modern

tools in the teaching process, and there is a good concern about flipped teaching and eLearning. On the other hand, The Center for Excellence in Teaching and Learning (CETL) at PPU conducts continuous training and workshops in the teaching and learning process at PPU. This shows how PPU pays great attention to entrepreneurial education.

From the researcher's view, the theme of the university's policies and regulations has a moderate level, because the concept of entrepreneurship is a modern one, and the university does not possess a model for the transformation into an entrepreneurial university. Consequently, this study will assist in constructing an appropriate model that suits Palestinian situations and universities. However, the results showed that the lowest percentage was for the theme of the university's environment which scored a mean of (3,1). This explains the approval of most of the workers in the middle and senior management that this theme is less important in the university because of the physical constraints that face the university due to the lack of financial support from the Palestinian government. The researcher illustrates this in more detail at the end of this chapter, more specifically in the analysis of the interview conducted with the president of the PPU.

Table 4 is a ranking question that shows the elements ranking for a transition into an entrepreneurial university in order of importance, ranking the most important 1, the next 2, and so on. The results show that the most important requirements necessary to transform PPU into an entrepreneurial university are the university's leadership and entrepreneurship culture with relative frequencies of 0.32 and 0.29, respectively. Whereas the academic exchange is the least important requirement with a relative frequency of 0.03 from the perspective of the senior and middle management at PPU.

Figure 1 illustrates the priorities of the university requirements that are required for the transformation of PPU into an entrepreneurial university, which is based on the results of the third question of this study and from the perspective of senior and middle management. It shows that a university's leadership is the most important requirement for the university, while the academic exchange is the least important one.

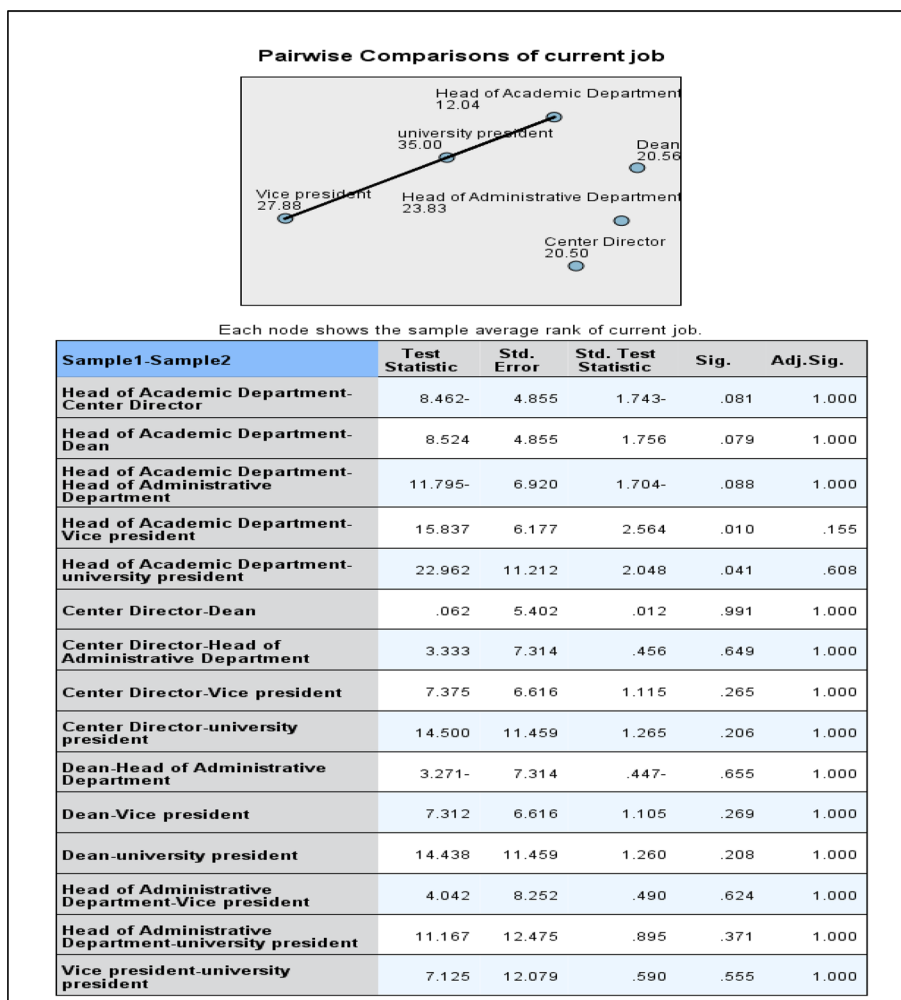
Figure 2 shows the pairwise comparison between respondents' perspectives towards the *university's leadership* theme according to the current job shows that there is a significant difference between the head of the academic department and the vice president, in addition to the difference between the head of the academic department and

**Table 4** Ranking question (relative frequencies)

No	Elements for a transition into an entrepreneurial university	Relative frequencies
1	University's leadership	0.32
2	Entrepreneurship culture	0.29
3	Entrepreneurial education	0.16
4	University's policies and regulations	0.13
5	An appropriate curriculum that meets the labor market's needs	0.11
6	Scientific research and innovations	0.08
7	University's environment	0.05
8	University's internationalization	0.05
9	Community's relations and partnerships	0.03
10	Academic exchange	0.03



**Fig. 1** Priorities of the university's requirements required for the transition into an entrepreneurial university

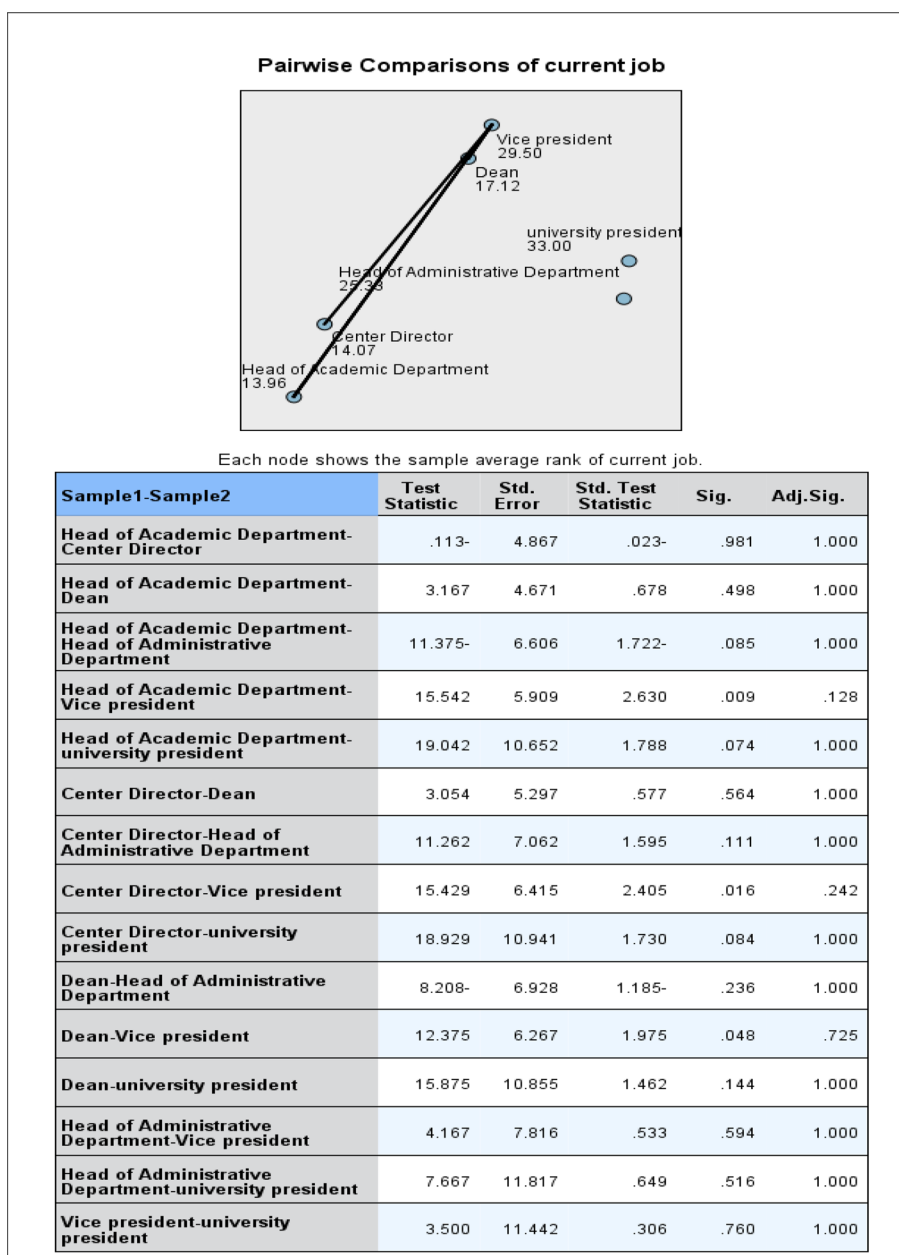


**Fig. 2** Pairwise comparisons towards leadership according to the current job

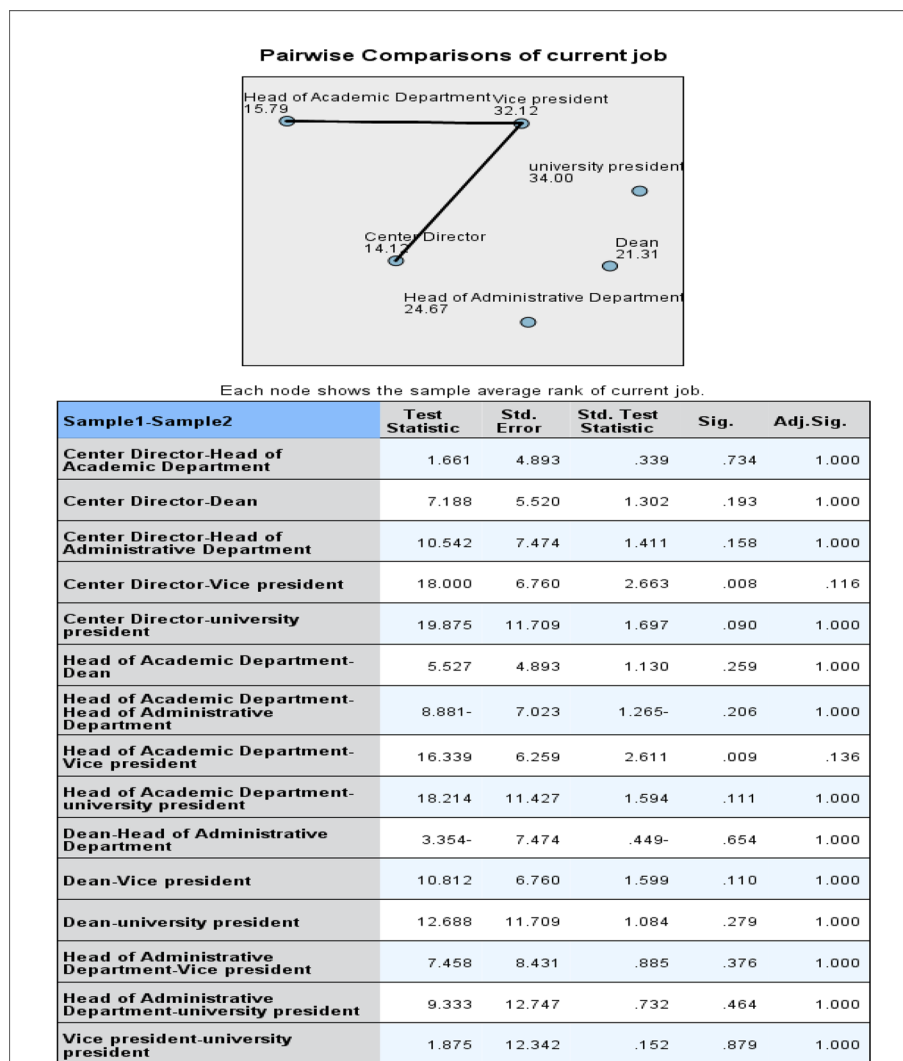
the university president, with *P* values: 0.010, 0.041, respectively, which is less than the significance level ( $\alpha = 0.05$ ).

Figure 3 shows the pairwise comparison between respondents' perspectives towards the *university's environment* theme, according to the current job, shows that there is a significant difference between the vice president and [head of academic department, center director, and deans], with *P* values: 0.009, 0.016, 0.048, respectively, which is less than the significance level ( $\alpha = 0.05$ ).

Figure 4 shows the pairwise comparison between respondents' perspectives towards the *university's internationalization* theme, according to the current job, shows that



**Fig. 3** Pairwise comparisons towards environment according to the current job



**Fig. 4** Pairwise comparisons towards internationalization according to current job

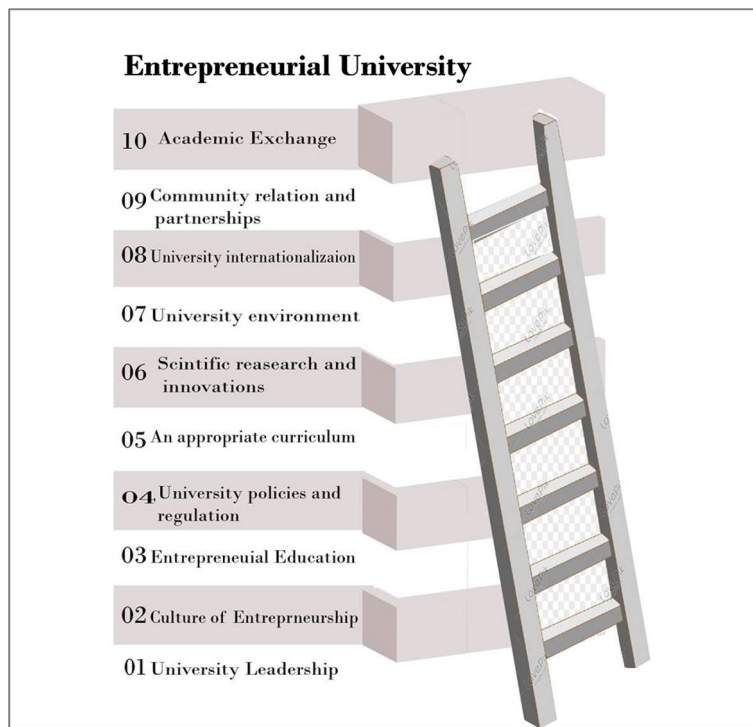
there is a significant difference between the vice president and [center director and head of academic department], with *P* values: (0.008, 0.009), respectively, which is less than the significance level ( $\alpha=0.05$ ).

According to the previous results, it can be noticed that PPU has the willingness to be an entrepreneurial university. It attempts, as much as possible, to reach this trend despite the restriction of the financial item. In addition, it tries to do entrepreneurial activities and is concerned with the aspects that can raise its development and reputation by continuing in its vision of entrepreneurship in light of the existing financial problem. The researcher adopts the results and concludes that the university should continue with the entrepreneurship concept gradually depending on the reality of the actual situation of PPU as appeared from the responses of the senior and middle management. It is worth mentioning that PPU is a Palestinian university, which has a special situation due to the Israeli occupation.

In summary of all the above-mentioned survey and interview findings, Fig. 5 shows the steps required for the transition of PPU into an entrepreneurial university, organized in ascending order and based on the researcher’s perspective.

However, the results of the one-way analysis of variance (ANOVA) regarding the differences show that there is a significant difference between respondents’ evaluation of the curriculum and the labor market criteria, with *P* value: 0.000 which is less than the significance level ( $\alpha=0.05$ ). In addition, the means were not equal for (1) respondents’ evaluation of the entrepreneurial education criteria; (2) respondents’ evaluations regarding the university’s policies and regulation criteria; (3) the respondent’s evaluation of the culture of entrepreneurship criteria; (4) respondents’ evaluation of the scientific research and innovations criteria; (5) respondents’ evaluation of the community’s relations and partnerships criteria; (6) respondents’ evaluation of the university’s environmental criteria; and (7) respondents’ evaluation of the university’s internationalization criteria. In contrast, the results of ANOVA of the differences show that there are no significant differences between respondents’ evaluation of the university’s leadership criteria, with *P* value: 0.182, which is larger than the significance level ( $\alpha=0.05$ ). In addition, the means were not equal for the respondent’s evaluation of the university’s leadership criteria, and between respondents’ evaluation of the academic exchange criteria.

Table 5 shows the results of Kruskal–Wallis test of differences of the respondents’ perspectives towards an entrepreneurial university model themes according to the variable the years of work experience and the variable current job position. As it can be seen from the table, the results of the Kruskal–Wallis test show that there are no significant



**Fig. 5** Steps organized in ascending order and required for the transition of PPU into an entrepreneurial university. (Developed by the researcher)

**Table 5** Results of Kruskal–Wallis test of differences of the respondents' perspectives towards an entrepreneurial university model according to the years of experience and the current job position

Theme	Kruskal–Wallis (Experience)	P value	Kruskal–Wallis (Job Position)	P value
Curriculum and the labor market	2.150	0.828	9.835	0.080
Entrepreneurial education	2.500	0.777	5.458	0.363
University's policies and regulations	3.882	0.567	10.493	0.062
University's leadership	8.387	0.136	11.212	<b>0.047</b>
Entrepreneurship Culture	3.115	0.682	5.401	0.369
Scientific research and innovations	5.630	0.344	10.089	0.073
Community's relations and partnerships	2.482	0.779	9.792	0.081
University's environment	6.937	0.225	11.701	<b>0.039</b>
Academic exchange	5.345	0.375	7.546	0.183
University's internationalization	4.606	0.466	11.311	<b>0.046</b>

differences between respondents' perspectives towards the following entrepreneurial university model themes: [curriculum and labor market, entrepreneurial education, university's policies, and regulations, entrepreneurship culture of, scientific research and innovations, community's relations and partnerships, and academic exchange], which may be attributed to the current job. Their  $P$  values were: 0.080, 0.363, 0.062, 0.0369, 0.073, 0.081, 0.183, respectively, which is more than the significance level ( $\alpha=0.05$ ). However, the previous table shows that there is a significant difference between respondents' perspectives towards the following entrepreneurial university model themes: [university's leadership, environment, and internationalization], which may be attributed to the current job position, with  $P$  values: 0.047, 0.039, 0.046, respectively, which is less than the significance level ( $\alpha=0.05$ ). This result indicates that if the university can make use of leadership, environment, and internationalization, the variable current job position will significantly enhance the transformation of the university from a conventional to an entrepreneurial university.

In light of the study results shown above, the university should go step by step in its entrepreneurship policy. It should start from the leadership by disseminating and spreading awareness about the culture of entrepreneurship throughout the university's staff and students. In the next step, the university should focus on entrepreneurial education, since it is a very important aspect for graduates who have innovative ideas that enable them to start their startups. The university policies should be considered, since they are the systematic way to achieve the goal of entrepreneurship, which is followed by the scientific research theme, because the innovations resulting from the research are the basic point for any university to be a leading one. Moreover, the university's environment would be the next step, because it influences the achievements and efforts of students and staff. The university should focus more on its environment, which is considered as the eighth step, since this environment is the mirror to the community and needs to keep in pace with other leading universities externally. The ninth step would go for the university's relations and partnership, which are essential to increase the cooperation agreements between the university and community and can develop w the curricula and majors to suit the needs of the community and labor market. Academic exchange, which is important to increase experiences between the university and leading



universities abroad, would be the last step for the transition of the university into an entrepreneurial one.

On the other hand, the questionnaire's findings show that there are differences between the responses of the senior and middle management, which means the closer the current work is to the senior management, the more the answers will be different, as the employees in the senior management differ their point of views on the reality of entrepreneurship in the university, given their broader authorities in leadership, decision-making, developing plans and the university's vision, in addition to the external and international dealings. This explains the different responses to the themes of university leadership, university environment, and internationalization. It also reveals that the PPU lacks a systematic methodology to align curricula with the labor market's needs. This is due to the Palestinian industry being limited to local industries, with low competitiveness in this issue as the Palestinian situation is constantly changing.

The findings also show that the PPU faces a financial crisis caused by a decrease in the percentage of financial incentives given to employees in exchange for the pioneering results obtained. These incentives are limited to the ones received through funded projects, where most of these projects are subject to the donors' terms and not to PPU's needs. In contrast, the PPU's scientific research is a step towards progress despite the existing obstacles. Furthermore, it was shown that linking research results with the labor market's needs by creating innovative companies affiliated with the PPU would require a complete system to follow practical research, a general policy to encourage scientific research, and approval from the High Authority in Palestine.

One of the main findings shows that PPU has a limited role in converting theoretical research outputs into practical innovations. This is because scientific research needs to be financed and allocated a specific budget and risk. After all, the results may not achieve the required goal. On the other hand, the contribution of the community's relations and partnerships in financing PPU projects was limited to financing the infrastructure and does not go for the university to improve its environment. However, the university is trying to pursue its vision of entrepreneurship within the existing context despite the financial hardship.

Regarding the PPU's scholarships offered for faculty members to study at leading universities worldwide, it was found that there is no scholarship system in the university, because this issue is related to the financial aspect in addition to the lack of governmental support for this issue.

## **Discussion**

The study confirms the definition of the entrepreneurial university that it works with unremitting steps towards being distinguished in all its strategic, organizational, educational, humanities, environmental, and financial levels. Curriculums, scientific research, and entrepreneurial education are necessary to address local community problems (Arruti & Sáenz, 2018). The university's role focuses to expand and transfer knowledge locally and internationally as well as creating jobs for graduates rather than just employment, this result is consistent with results in other previous research (Abdel Wahab, 2018; Ndofirepi, 2020). Results related to the reality of entrepreneurial education showed that the university has policies that encourage instructors to use a

learning strategy based on the use of practical laboratories. In contrast, it has policies that encourage instructors to use electronic education in the educational process. It also has programs aimed at training students in building and forming entrepreneurial ideas. While the university is advised to pay more attention to the policy of encouraging instructors to use simulation in the educational system, and encouraging them to analyze the strengths and weaknesses in the educational process.

The findings related to the reality of entrepreneurship in policies and regulations indicated that the university in its strategy has no effective policies on the importance of being an entrepreneurial university, although the university's strategic plan includes a future vision and a clear message towards an entrepreneurial university. While the PPU should focus more on forming a bank for entrepreneurial ideas that result from the research (Abidi et al., 2022), the incubator available at the university is highly sought to establish productive or service projects that are in line with the community's needs. The PPU aims to consider the complementary relationship between the university, the businesses, society, and environment, and the government, this result is likely to be consistent with other previous studies (Abdel Wahab, 2018; Carayannis & Rakhmatullin, 2014). Differently, the results showed that the PPU has no grants of financial incentives against the entrepreneurial results obtained from workers and students. Furthermore, the results indicated significant differences between respondents' perspectives towards university policies and regulations.

Policymakers are urged to undertake a context, where policies can turn globalization to enhance long-term entrepreneurship opportunities (Arshed et al., 2022). However, the findings showed that the PPU leadership focuses on increasing demand for university services, and it adopts constructive leadership ideas to maintain its development, but it does not diversify from its funding sources significantly to maintain its independence. In addition, the findings revealed that it is necessary to consider leadership, entrepreneurship education, scientific research and innovations, university environment, internationalization, and academic exchange to transition from a regular university to an entrepreneurial university. This result is likely to be supportive of (Arshed et al., 2022), who indicated that the quality of education is necessary to stimulate economic and political globalization, which is necessary to boost entrepreneurship in the long run. Likewise, Amofah and Saladríguez (2022) showed that using entrepreneurship education is necessary to boost the entrepreneurial spirit of students.

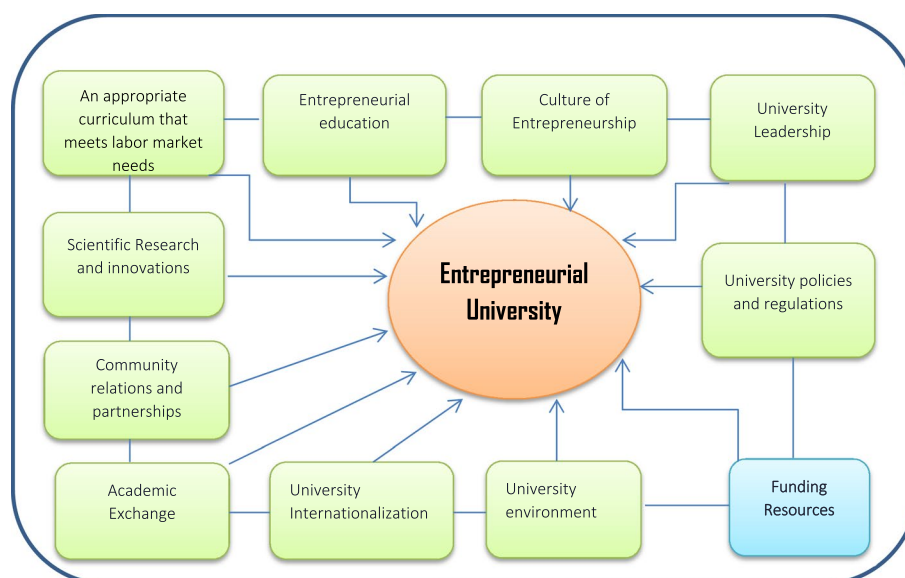
According to the study results, the PPU's vision is likely to support the university's academic exchange and internationalization, which is likely to be in harmony with (Abu labhan, 2018; Al-Shammari, 2010). On the contrary, respondents who are working at the lower and middle management reveal that these important policies are still not applied as needed in the PPU, while respondents who are working at the senior management level reveal that they follow and apply such an entrepreneurial strategy. Furthermore, Effective public institutions that can support and provide scholarships for students or fellowships to faculty members are still irregular. This result reveals that it is likely to be a significant barrier to adopting an entrepreneurial strategy of transition, since the triple helix model of innovation verified how is important to consider the networks and relationships among universities, industry, and government (Carayannis & Campbell, 2011).

## Conclusions

Entrepreneurship is considered an integrated process consisting of a group of elements. The triple, quadruple, and quintuple helix innovation model take into consideration the networks and relationships among universities, industry, government, citizens, and environment (Carayannis & Campbell, 2011; Carayannis & Rakhmatullin, 2014; Carayannis et al., 2012).

The absence of any of these elements may negatively affect the overall process's performance, especially innovative ideas enhancing the transformation from a conventional to an interneural university are necessary to be taken into account. This conclusion is likely to be consistent with Wathanakom et al. (2020) who revealed that innovativeness causes entrepreneurial intention, and innovativeness can effectively predict entrepreneurial intention amongst undergraduate students. Formal education enhances entrepreneurship and is correlated with entrepreneurial activity and success, but correlation does not indicate causation. Education and entrepreneurship are affected by other related factors (Ahn & Winters, 2022). Accordingly, higher education institutions are advised to promote innovativeness for meeting entrepreneurial universities.

Accordingly, the researchers are likely to provide policymakers with a proposed model for the PPU transition from a conventional to an entrepreneurial university, which is the overall objective of this study. Figure 6 presents a model for the entrepreneurial university that the researchers propose. Furthermore, the conditions are linked to each other, taking into consideration that the absence of any of these requirements will cause a disorder in the achievement of PPU's entrepreneurship vision as required. Different funding resources may accelerate the university's entrepreneurship success as needed, which contributes to increasing the capability of the university for facing its financial problems that may touch on other requirements in the proposed model. Accordingly, Linton and Klinton (2019) in their paper investigate how entrepreneurship education



**Fig. 6** PPU entrepreneurial university model

with a thorough perspective can be achieved by utilizing design thinking. Adopting an innovative methods approach for teaching entrepreneurship is beneficial for any future transition.

Given that, a proposed mechanism for taking the proposed model into practice was provided. The university leadership is advised to consider decentralization in the administration process. It needs to diversify its funding sources to maintain its independence, and enhance the role of the entrepreneurial business incubators, which is necessary for enhancing innovation, entrepreneurship, and competitiveness. Paying more attention to the culture of entrepreneurial education, scientific research, and labor market needs is essential to be considered by both the university and government, especially the triple helix model of innovation indicates a set of interactions among the university, the industry, and the government is supposed to enhance economic and social development (Cai & Lattu, 2021).

### **Policy implications**

Table 6 shows in detail the process that PPU should develop entrepreneurship concerning each component considering the funding resource component which accelerates the process of achieving entrepreneurship at PPU. Towards the transformation process, the university is advised to assess the impact of entrepreneurial activities systematically, by tracking the number of partnerships with the industry, the recruitment offices for graduates in the labor market, the number of startups, and the number of participants in them. These efforts should be unified, so that utilization will be achieved across all the university aspects. The measurement process should not be limited to quantitative measurements, but rather be supported by qualitative ones. On the other hand, entrepreneurial education should be evaluated through student surveys, follow-up interviews, and focal interviews to collect more detailed information, including evaluation indicators such as participant satisfaction, participants' motivation to start emerging projects, the level of competencies, and skills acquired in teaching and learning. A survey of students might be required before the beginning of the teaching process to assess their attitudes, knowledge, and motivation in entrepreneurship. Likewise, evaluating the same process at the end of the educational process to determine changes in the student's attitudes and opinions. This survey should be done systematically for all entrepreneurial courses if learning outcomes are evaluated collaboratively with higher education institutions.

Achieving university leadership also requires that the university rethink how to use its human and financial resources to overcome internal shortcomings. Skills and competencies must be reviewed to assess institutional development needs, integrate the results of skills assessment into employment strategies, and take advantage of external partnerships to address any gaps in skills. It is worth saying that the university must provide moral and financial incentives for the results of the entrepreneurial activities that it obtained from entrepreneurs. Accordingly, PPU should try to overcome its financial hardship through the following suggestions:

- Investing in relationships with the community by producing research that has applied results (innovations).

**Table 6** Process to develop entrepreneurship at PPU

	PPU model components	Process
Funding Resource (Accelerating element)	University leadership	Responding to the changes that occur in the local environment Implementing a policy of decentralization Integrate the performance of its various faculties Management according to its objectives, Diversifies funding sources to maintain independence
	Culture of entrepreneurship	Train employees on the application of entrepreneurial ideas in business Encourages its employees to participate in external developmental programs Engaging the Students' Union Council in the implementation of its entrepreneurial ideas
	Entrepreneurial education	Policies that encourage teachers to use a special case study Policies that encourage teachers to use (critical thinking) Policies that encourage teacher's simulation strategy Analyze students' strengths and weaknesses points
	University's policies and regulations	Granting moral incentives for the entrepreneurial results Financing entrepreneurial projects for students Regulations for entrepreneurial activities Bank of entrepreneurial ideas resulting from research Granting financial incentives for entrepreneurial results
	Curriculum and labor market	Developing curricula according to the labor market Develop curricula to keep pace with scientific development Continuously update curriculum plans Achieving interdisciplinary objectives Raising students' higher thinking levels Compatibility between outputs and labor market needs Students' assessment of consistent with the courses' outcomes Systematic methodology in studying labor market needs
	Scientific Research and innovations	Publishing research in scientific journals Allocating a specific budget for research Activate the role of the innovation center and technology transfer resulting from applied research Researches associated with the needs of the labor market Provides necessary capabilities for the work of pilot research projects The increasing number of patents associated with research results Transfer the outputs of applied research (innovations) to the labor market Creating innovative companies

**Table 6** (continued)

PPU model components	Process
Entrepreneurial environment	Equipment's for various teaching aids Required medical care for students Staff with a suitable environment Special services for students with special needs Multi-purpose halls for students' activities Yards to suit the number of students Large green areas
Community relations and partnership	Increasing relations and community partnerships to its financial returns Increasing community partnerships to enrich academic curricula Increasing relations and community partnerships to raise finance Increasing relations and community partnerships to increasing the number of practical researches which correspond to the needs of the labor market
Academic exchange	Guidance and counseling for students who are offered a scholarship Increasing academic exchange opportunities for both students and teachers
Internationalization	World-class professional development programs for faculty Sending the academics to world-leading universities Hosts international visiting teachers Attracting internationally renowned faculty to work

- Launching projects that may achieve financial returns on the university as an alternative to bids, such as the establishment of (student services libraries, cafeterias, group study halls, supplies for all university fields of study, requirements for scientific research, and graduation projects).
- Moving to e-learning to save from using university resources, such as halls, papers, publications, and paper exams.
- Forming committees from within the university with the assistance of outsourcing advisory members and specialists.
- Conducting real feasibility studies for projects established by the university.
- Hosting some external princes and businesspeople to be members of the university Graduates Union to support the university.
- Investing in student projects, such as investing in excellent artistic paintings, designed by students in graphics and multimedia majors (diploma/bachelor) by selling them in charitable exhibitions in Arab countries to support the university.
- Creating a media production center with television and radio to produce videos and news to generate income for the university.

**Further research**

This study focused on studying the reality of entrepreneurship at Palestine Polytechnic University from the perspective of senior and middle management, it is necessary

to conduct other studies related to this subject that measure the impact of achieving entrepreneurship requirements at PPU. It is also important to conduct another study from the students', graduates', and teachers' perspectives. Other studies are required to know the extent of achieving entrepreneurship requirements in Palestinian universities. In addition to the role of the entrepreneurial university in achieving competitiveness among Palestinian universities. In the same context, it is important to explore the purpose of the funding resources to attain entrepreneurship at Palestinian universities. Furthermore, many studies are required in Palestine to detect the role of every component of the entrepreneurial university in achieving entrepreneurship at Palestinian universities.

#### Abbreviations

CETL	Excellence in teaching and learning
ANOVA	One-way analysis of variance
PPU	Palestine Polytechnic University

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#### Author contributions

The co-authors made a significant contribution and agreed with the contents of this paper. All authors read and approved the final manuscript.

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#### Declarations

##### Competing interests

The authors declare that they have no conflict of interest or competing interests.

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