

EVALUATE THE ENTREPRENEURIAL CAPACITIES OF SCHOOL OF ENGINEER: CASE STUDY ESPRIT

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ABSTRACT

Entrepreneurship and innovation are two key elements for economic development. This is why the integration of entrepreneurial aspects into engineering training seems obvious and aligned with CDIO standards (especially optional standard 3). The creation of a new profile of engineers capable of combining technological innovation with business challenges and social development is not limited to the integration of entrepreneurship teaching but must be developed through the entrepreneurial university model. The university's openness to its economic and social environment has shifted its mission and role from that of a distributor of knowledge to a broader role as a generator of value. This extension of the mission has triggered the emergence of the entrepreneurial university concept. It is against this backdrop that this article, which focuses on assessing the entrepreneurial capacity of universities, has been drawn up, using the Esprit private college of engineering and technology as a case study. We are designing a quantitative approach that will enable us to understand practices within the university. This study will enable central universities to self-assess in relation to the context of entrepreneurial practices. The development of an evaluation model for the entrepreneurial university concerns our working methodology for measuring the entrepreneurial capacity of universities. This study consists of developing a methodological framework comprising the good entrepreneurial practices according to which the university will be assessed, and a mathematical aggregation model to determine the composite measurement indicator. This test of our evaluation method is based on a case study of the ESPRIT school of engineer.

KEYWORDS

Entrepreneurship, Entrepreneurial engineering, Standard: 3

LITERATURE REVIEW

The national innovation system is experiencing a notable increase in the importance of entrepreneurship opportunities (Hosseini et al., 2020; Ziyae et al., 2019), as it plays a vital role in driving economic growth through the creation of innovative solutions that arise from identifying market opportunities. The university, like any other organization, needs to adapt to this new paradigm to maintain and enhance its influence on the scientific, economic, and social environment. This is a key challenge for the higher education system, especially engineering schools, as they have the responsibility to provide individuals and societies with the necessary skills and knowledge to thrive in the future (OCDE 2022).

The opening of the university to its economic and social environment has developed its mission as much as that of distributor of knowledge towards a broader role and generator of value. This role expansion becomes especially urgent for engineering schools to create new student profiles capable of following rapid changes in society and working life and combining technological innovation with commercial challenges and social development. This is why universities are placing more and more emphasis on targeting engineering and science students with an entrepreneurial spirit (Venkataraman, 2004).

The definition of the entrepreneurial university concept is variable and depends on the culture of the academic community and how it shares this concept Marina Dabic (2017). Literature revealed a lack of a clear and unique definition for entrepreneurial universities; and it is due to the diversity of attitudes, cultures and values of academic community.

Indeed, the concept of the entrepreneurial always remains subjective and depends on the experience, the attitude, the belief and the culture of the population questioned about this concept, causing a certain diversity and relativity in the definition of the concept. By examining the literature, the entrepreneurial university is not limited on is typically linked to several concepts such as partnership with industry, the commercialization of knowledge produced, and research findings (Klofsten & Jones-Evans, 2000; Roessner, 2013).

The perspectives toward the entrepreneurial university would very depending on the actor that has been questioned.

The development of the university role from its traditional mission, centered on teaching and research; towards its third mission becomes a necessity to survive in the current economy. The transition to entrepreneurial universities has been and will continue to disrupt national and regional development as well as international competition. This is why universities are faced with the need to self-assess in relation to their practices and strategies, in order to be able to adapt to this flow. It is within this context that the present study is situated.

This paper is organized as follows: Section1 literature review, section 2 presents the research design while section 3 the case study.

RESEARCH DESIGN

Research Method

The aim of our study is to determine an assessment of good university entrepreneurial practices in the African context, for this our work will be divided into 3 main steps.

- **Step1:** We will start by determining the criteria for evaluating entrepreneurial capacity that reflect the good entrepreneurial practices of the university. The choice of these criteria will be essentially based on the bibliography and especially the challenges of the African context.
- **Step2:** consists in determining the importance of each criterion of the methodological framework. We start with a first phase which consists of carrying out a binary comparison followed by a calculation of the priority of each criterion based on the opinions of the experts consulted during our study. We adapt in this phase the Analytic Hierarchy Process AHP method (Saaty, 1990). The second phase consists in determining the weights of each criterion by the aggregation of the weights assigned by the expert using the Group Decision Making (GDM) .
- **Step3:** The last step of the evaluation process developed concerns the calculation of the overall score through the calculation of the composite index by the weighted sums method (SAW)(Afshari2010), this step will be carried out after having drawn up a questionnaire reflecting good practices these questionnaires will be used to collect information and to develop our quantitative study concerning our case. The methodology adopted for the assessment of university entrepreneurial practices is described in detail in figure i in the Appendix.

Conceptual Framework

Based on the literature review, we chose to develop 7 criteria that describe good practices for an entrepreneurial university (table 1). During the development of our study framework, we took into consideration the review of the literature and we tried to enrich it, the integration of factors that seem important to us is adapted to the context of African universities. We have taken into consideration the very low employability rate, also a financial dependence on the government which is generally characterized by an inability to finance and the language barrier. The hierarchical structure of this research decision problem is shown in figure i in the appendix. The criteria that make up our methodological framework are as follows.

Policies and governance

According to Clark (1998), an Entrepreneurial University, on its own, seeks to innovate in how it goes to business. It seeks to work out a substantial shift in organizational character so as to arrive at a more promising posture for the future. (Gibb and Hannon 2005) explain from their part that Universities organizational structure should be designed as to promote and facilitate entrepreneurial behavior based on these assertions on the part of several authors in the literature. We have proposed this dimension which describes the strategic orientation of the university and its vision to establish the entrepreneurial aspect, this is reflected by the commitment of the institution, governance and risk taking and rules and law.

Entrepreneurial culture

Several authors in the literature have agreed on the importance of establishing an entrepreneurial culture in the universities to promote the entrepreneurial model of the latter. He considers this criterion to be an essential dimension for all entrepreneurial universities, one cites for example Sporn (2001: p. 132) explains that “an entrepreneurial culture will help universities to develop a new climate for innovation and change”.

Resources and capabilities

In its resource-based approach, Guerrero & Urbano (2012) introduced the internal capacities and resources of the university as effective factors in the development of the entrepreneurial concept within these institutions. These internal resources of the university can be physical not concerning the adequate infrastructure or financial good by funds, aid to research. Zaharia & Gibert (2006) in their article entitled "The Entrepreneurial University in the Knowledge Society we considered that the management of this capital is among one of the 4 factors around which the strategy of transformation of the company is articulated to ensure transition from traditional university into an entrepreneurial university.

Education and research Teaching and research

Teaching and research are part of the former missions of the university, fundamental functions of universities, which have been supplemented and extended by the entrepreneurial mission through the opening of the university to its external environment. To transform itself into an entrepreneurial university, and as already indicated, the university must act internally by setting up an entrepreneurial culture, of which education is one of the means of doing so, In this context (European Commission 2012) affirms that education more specifically entrepreneurial education is a key element to stimulate entrepreneurship in students who can acquire entrepreneurial skills and transform their profiles from job seeker into entrepreneurial job creators. Likewise, the university must also act externally to its environment by marketing research activities. We have chosen to divide this dimension into 3 sub-dimensions which are entrepreneurial education, teaching method and research and interdisciplinary.

Entrepreneurship support

According to (Guerrero et al., 2015) Entrepreneurial universities are facilitators of economic development focused on entrepreneurship and this through institutional contexts conducive to entrepreneurial activities. This institutional context is essentially reflected in the structure of support and accompaniment of entrepreneurship. These structures are intermediaries that drive technological advances and facilitate the process of technology diffusion through the development of an environment that stimulates collaboration between universities, industry, and other actors in society. Entrepreneurship support aims to support the creation of new businesses, including small businesses and research groups (Redford 2014). It offers a variety of services such as mentoring, coaching, financing, advice, incubation.

Entrepreneurial and innovation impact

An entrepreneurial university should be seen as a big influent stakeholder in the entrepreneurship ecosystem. Many authors in the literature (Sporn, Estkowitz) link the definition of entrepreneurial university to the exploitation of research results and an involvement in regional development. This dimension essentially deals with the outcomes of entrepreneurial universities in terms of commercialization of research results, of the impact of

these results on the regional and territorial economic level. The commercialization of research is the output of the entrepreneurial university. This dimension is evaluated through Academic spin off spin off, patent, patent. The importance of these achievements of the entrepreneurial university is underlined by (Lockett et al., 2005). In this context the author indicates that the concept of entrepreneurial university is wrongly associated simply with the technological commercialization of research and the number of patents, licenses, research projects and spin-off companies” (Lockett et al., 2005 of research., and the number of patents, licenses, research projects.

Table1. The good practices for an entrepreneurial university based on our framework

Dimensions (Criteria)	Practices
<i>C1. Policies and governance</i>	<ul style="list-style-type: none"> -The university has ingrained an entrepreneurial spirit into its core ethos, with a clear vision and mission that showcases its dedication to fostering entrepreneurship. -The university maintains autonomy in its governance and decision-making, while also committing to transparency and continuous improvement through regular evaluations of its entrepreneurial activities -The universities Allocate funds and resources for innovative projects involving staff, teachers and students. -The university Establish a Proactive Intellectual Property Framework: Form a legal advisory council to actively protect intellectual property and ensure the security of research outcomes and patents, while also implementing clear and comprehensive guidelines to provide a robust legal structure for the entire university community.
<i>C2. Entrepreneurial culture</i>	<ul style="list-style-type: none"> - The university has established a formal process for managing ideas, from their inception to evaluation, fostering a systematic approach to innovation. - Staff and students are encouraged to engage in innovative activities, supported by a dynamic environment that includes competitions and entrepreneurial clubs. - Entrepreneurship is deeply embedded in the university’s culture, with regular events and activities that promote this mindset, and it’s a significant factor in staff appraisals. - The university supports global engagement by using English as the medium of instruction and offers personal development resources, including well-being centers and life skills training.
<i>C3. Resources and capabilities</i>	<ul style="list-style-type: none"> -The university Recognize and cultivate the expertise of employees, whether they specialize in one area or possess multidisciplinary skills. -the university has essential material resources like co-working spaces, laboratories, and research centers to support academic and entrepreneurial activities. -The university Maintain a portfolio of immaterial resources, including publications and intellectual property assets such as patents, trade secrets, copyrights, and trademarks, as well as software and codes. -Alternative Income Sources: Develop alternative income sources for the university, such as renting out facilities, laboratories, and residences. -The university Allocate financial capital specifically for entrepreneurship and the creation of new ventures, fostering an environment that supports innovation and business development.

<p><i>C4. Education and research Teaching and research</i></p>	<ul style="list-style-type: none"> -The university curriculum includes mandatory entrepreneurship courses to ensure that all students gain foundational knowledge in starting and managing businesses. -The university is proactive in recruiting individuals who specialize in entrepreneurship, enriching the academic environment with their expertise and experience. -Dedicated research programs in entrepreneurship are conducted at the university, promoting innovation and scholarly inquiry into the field. -The university has a track record of publishing scientific papers on entrepreneurship in peer-reviewed journals -The university employs various active teaching methods, including competency-based approaches, and project-based learning, to cater to diverse learning preferences and educational outcomes.
<p><i>C5. Alliance and network</i></p>	<ul style="list-style-type: none"> - The university establish collaboration contracts with: Academic partners Industrial partners, public sector. The university has a significant proportion of co-authored work with industrial partners.
<p><i>C6. Entrepreneurship support</i></p>	<p>The universities Offer robust support services, including advisory services for startups, which are vital for guiding young entrepreneurs through the early stages of business development.</p>
<p><i>C7. Entrepreneurial and innovation impact</i></p>	<ul style="list-style-type: none"> - University focus on achieving impactful research outcomes, including the development of spin-offs, academic entrepreneurship, licensing agreements with national companies or local startups, and the commercialization of research projects within the industry. -The university is encouraged to actively participate in social and regional projects, contributing to the development and well-being of the surrounding areas. -The university prioritizes attention to Sustainable Development Goals (SDG) in its operations and academic programs.

Mathematical Aggregation Formulation

Determining the weighting associated with the frame dimensions.

The calculation of the weights of the criteria composing our methodological framework will be through the AHP method combined with the GDM method which will allow us to quantify the importance of the criteria to subsequently calculate the composite index.

In order to complete this step, we created a questionnaire and sent it to a panel of experts in a variety of areas, such as entrepreneurship, innovation, and university education. The experts answered to the pre-made questionnaire, which contained the dimensions (or criteria) that needed to be weighted. Eight pairwise matrices were included in the questionnaire; one matrix, with size seven, represented the first level of the developed conceptual framework, and seven more, with sizes ranging from two to five, represented the second level of the framework. An example of these matrices is illustrated in Table 2. Following the processing of the data, we noted an inconsistency in the weighting logic of 2 experts in fact, the results of the weighting a

consistency ration not accepted, for a time constraint which prevented us from making feedback and correcting them. Necessary, we were satisfied with 6 experts.

Table 2. Pairwise comparison matrix relating to the dimension Policies and governance

Matrix	Institutional commitment	Governance Structure and risk taking	Rules and Laws	Government and administrative Framework	Monitoring and Evaluation
Institutional commitment	1	1/2	1/2	1/3	2
Governance Structure and risk taking	2	1	1	1	1/2
Rules and Laws	2	1	1	1	2
Government and administrative Framework	3	1	1	1	2
Monitoring and Evaluation	1/2	2	1/2	1/2	1

Application of GDM ET AHP

After determining the weights relating to each criterion according to the opinions of the selected experts, we applied the methods of aggregating individual judgments to obtain the overall weight more precisely, the AIP technique, the aggregation of individual priorities. The weights are then determined by applying the geometric means of the individual priorities and normalizing the values obtained.

Table 3 represents the weights relating to the criteria of the first level of the framework of the entrepreneurial university.

Table3. Table of weights relating to the criteria to criterion C1 Policies and governance

	Exp1	Exp2	Exp3	Exp4	Exp5	Exp6	Standardized weight W'	Rank
C11: Institution Commitment	0.097	0.108	0.198	0.181	0.094	0.076	0.128	5
C12: Governance structure and risk taking	0.203	0.424	0.13	0.364	0.194	0.113	0.233	1
C13: Rules and Law	0.254	0.143	0.184	0.239	0.194	0.257	0.228	2
C14: Government and administrative framework	0.183	0.255	0.185	0.108	0.195	0.198	0.192	4
C15: Monitoring and Evaluation	0.263	0.07	0.303	0.108	0.233	0.356	0.219	3
RC (≤ 0,08)	0.07	0.05	0.08	0.02	0.05	0.08		

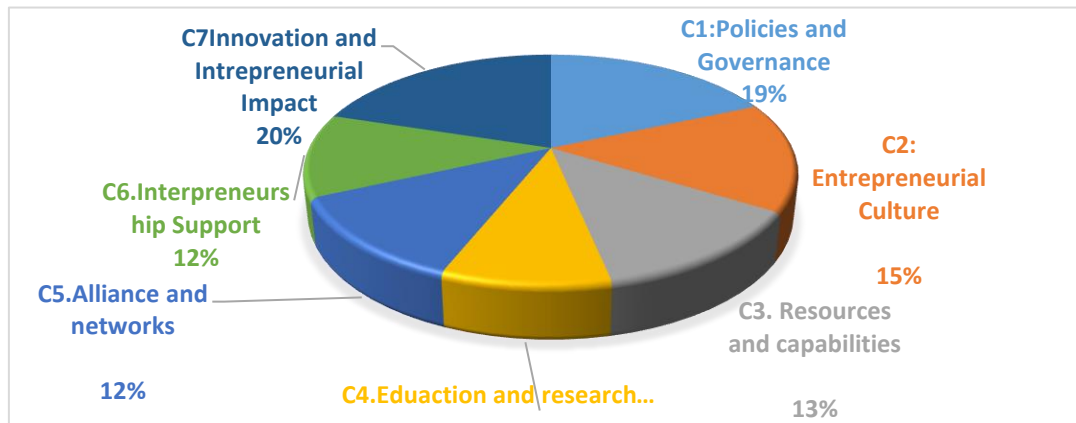


Figure 2. The weight distribution of the first level criteria of our methodological framework

After the synthesis of the weighting results of the first-level criteria of our methodological framework (figure2) we find that the weights of the level 1 criteria are distributed according to 4 levels: The first is composed of the following criteria "Innovation and entrepreneurial impact" with a weight equal to 20% followed by the criteria policies and governances with a variation of 2% or 18% of the total weight of level 1 of the framework. These two criteria are the most important in terms of weight distribution, with an overall weight of 38%, accounting for almost one-third of the total weight of Level 1 of the frame. This value indicates the importance of this factor in relation to the specialist in the process of evaluating the entrepreneurial university, if we analyze more closely, we find that these two criteria present criteria of entry and exit from the process of university entrepreneurship. The entry criteria are translated by, policy and governance, whether internally through the university's engagement, these values and its entrepreneurial vision or even externally through the flexibility of government governance translated into an entrepreneurial strategy that offers a university an Independence enabling it to work in an environment conducive to entrepreneurship and creativity. The second level Include the second criterion of the framework «the entrepreneurial culture» of weight equal to 16% of the total weight of the level 1 of the framework. With this weighting, the specialists express the importance of establishing the entrepreneurial culture within the university to facilitate its transformation. Fostering the community's commitment toward entrepreneurship. The third level includes the entrepreneurship support and alliance and network criteria, each with an equal weight of 12 and the Resources and capabilities dimension with a slight increase of 1%. In the last level, we find the education and research dimension in the last rank with a weight of 9% of the total weight. In the final step, the education and research dimension is ranked last with a weight of 9% of the total weight. The experts considered that key factors for assessing the entrepreneurial capacity of the university are governance, culture, alliance and resources. their choices from our point of view are inspired by places experience within the Tunisian academic or industrial environment this environment develop the embryonic situation of mechanisms that boost academic entrepreneurship that essentially feel most weighted criteria of the experts' share.

Similarly in Africa, African universities suffer from the same problem in terms of governance and Independence from university to government. On the other hand, the experts say that the criteria education and research is development is the least important it is induced according to our opinion, to the fact that these criteria are considered on the part of the specialists and

acquired for any university since they present the first and second mission of the traditional university.

CASE STUDY: ASSESSMENT OF THE ENTREPRENEURIAL CAPACITY OF ESPRIT

This part will be devoted to the implementation and the testing of our work. We then chose the private higher school of engineering and technology of Tunis ESPRIT as a case study to evaluate these practices in relation to our framework to design Entrepreneurial university. To give him recommendations on the one hand and to improve our framework on the other hand.

Data Collection

To collect information on the degree of application of good practices relating to our methodological framework of the entrepreneurial university, we carried out a quantitative study to develop a questionnaire which reflects quantifiable, observable and measurable practices. We have developed a questionnaire of 52 questions which reflect all the good practices developed at the level of dimension and sub-dimension of our Framework. We have opted for closed questions to minimize the error did not direct the answers.

Table4 shows an example of a yes or no question and an example of a multiple-choice question for the first dimension of our framework.

Table 4. Example from the survey

C1- Polices and Gouvernance		
C12. Governance structure and risk taking		
Are there any innovative projects funded by the university?	Yes	<input type="radio"/>
	No	<input type="radio"/>
Are there any innovative projects funded by the university in collaboration with? Check all that apply.	Staff	<input type="radio"/>
	Teachers	<input type="radio"/>
	Students	<input type="radio"/>
	Graduates	<input type="radio"/>

Data analysis (saw method)

After assigning weights to the different dimensions (criteria) of our entrepreneurial university framework we start to calculate the composite index.

The composite index will be calculated using the Simple Additive Weighting (SAW) method. Which is also known as weighted linear combination or scoring methods Simple Additive (Afshari2010), SAW is a simple and most often The calculation of the composite index by the Simple Additive Weighting (SAW) method is summarized in three steps as shown in the table.i in the appendix .

Step 1: Calculation of local scores

We will begin by calculating the scores related to the different dimensions, which we will refer to as local scores for ESPRIT. The local score is the total score awarded to Esprit by summing its responses for each dimension. An example of the methodology for assigning scores to responses for the fifth dimension is outlined in detail in Table 5.

Table 5. Summary of the question scoring methodology for the 5th dimension "Alliances and networks."

Section(s)	Question(s)	Scoring Technique
Sub-dimension	closed – end question: yes or No question or question with unique choice	0 pts; if 0 Reponses is « No » 4pts, if 1 Reponses is « Yes »
C51. Public Private Partnerships	Does the university have collaboration contracts with Academic partners Industrial partners' public sector.	0 pts; if 0 Responses is «No » 1 pts; if 1 Responses is «Yes » 2 pts; if 2 Responses is «Yes» 3 pts; if 3 Responses is «Yes» 4 pts, if 4 Responses is «Yes

The local (individual) scores, which assess the performance across various dimensions (levels 1 and 2), will be derived from the responses to the questionnaires intended for the university in our case study, ESPRIT.

Step 2: Normalization of Individual Scores

To increase its reliability, the weighted sum method requires the use of comparable scales. Therefore, we will proceed to normalize the individual scores. This normalization aims to free us from the units specific to each of the original scales. The table i in the appendix summarizes the weighted scores and the individual scores of the ESPRIT University.

Step3: Calculation of the composite index

Table 6 represents the composite index of ESPRIT and details his current situation to have this score.

Table 6. Calculation of the composite index (overall scores)

<i>Dimension</i>	<i>ESPRIT</i>	<i>Status</i>	<i>Composite index</i>
<i>Policies and Governance</i>	0.397	<p>- Esprit do not Allocate funds and resources for innovative projects involving staff, teachers and students.</p> <p>-Esprit didn't have a clear vision and mission that showcases its dedication to fostering entrepreneurship.</p>	0.554
<i>Entrepreneurial Culture</i>	0.657	<p>Esprit Offer a dynamic environment to encourage students and teachers but not staff to engage in innovative activities, supported by that includes competitions and entrepreneurial clubs.</p> <p>- Entrepreneurship is deeply embedded in the university's culture, with regular events and activities that promote this mindset, and it's a significant factor in staff appraisals.</p> <p>-ESPRIT has made strides in supporting global engagement by adopting English as the medium of instruction and providing personal development resources, such as well-being centers and life skills training. However, these initiatives have not yet been fully realized to their utmost potential.</p>	
<i>Resources and Capabilities</i>	0.65	-Esprit knowledge and fosters the talents of its staff, who may be experts in a specific field or have a broad range of skills. is equipped with vital physical resources, including shared workspaces, labs, and research facilities, which are instrumental in advancing scholarly and business initiatives.	
<i>Education and research</i>	0.896	-ESPRIT supports, promotes, and evaluates the development of entrepreneurial skills. ESPRIT stands out in Tunisia for its innovative educational approaches. By embracing active teaching methods like competency-based approaches and project-based learning	
<i>Alliance and networks</i>	0.874	ESPRIT is committed to fostering cross-sectoral partnerships, promoting international experiences, and strengthening the global relevance of its educational programs.	
<i>Entrepreneurship measure</i>	0	Total absence of service support for entrepreneurs such as Innovation clusters, Incubation spaces, Technological parks, Knowledge transfer Office	
<i>Innovation and entrepreneurial Impact</i>	0.524	<p>- ESPRIT actively participates in social and regional projects, contributing to the development and well-being of the surrounding areas.</p> <p>-The university prioritizes attention to Sustainable Development Goals (SDG) in its operations and academic programs.</p>	

RESULTS AND DISCUSSION

Esprit got a very high score when it comes to teaching methodology, which is implied by this extreme university's policy of engaging in the application of active competency-based pedagogy and problem-solving real. Problem and Project Based Learning (PBL) remains at the heart of ESPRIT's pedagogy. This practice aims to put the engineer at the core of the process (collaborative projects and simulation activities) by tackling current themes each. Another reform has been put in place to integrate innovation and entrepreneurship modules into the study plans of studies in different disciplines. This module allows engineers to accumulate basic knowledge on business creation and the world of business. Familiarization of engineer with the concept of entrepreneurship through entrepreneurship education, of course is very important but it is not sufficient to really boost innovation and creativity, support measures must be put in place to try to propose innovative ideas, and to follow the advice and incubation of projects, these services can be intended for the whole university family. Despite the importance of these measures, we notice that in the case of ESPRIT, they are totally absent. Although the school has tried to set up an internal support service called ESPRIT UNCUBATION, which has offered ENGINEERS and staff support and incubation services and even funding that helps them in their entrepreneurial journey. Although the resources and the means of support existed, this structure was not successful in terms of incubated projects, in fact the number of people who consulted this structure was very modest. This failure may be due to a lack of an entrepreneurial culture at the time or to resistance to change on the part of the university community. Which does not lead to the question, is there an order of priority for the application of entrepreneurial practices and what is its impact on the success of the process of transforming universities into an entrepreneurial university?

According to the results, several measures can be taken to improve the entrepreneurial capacity of ESPRIT, among which:

- Establishment of strategic entrepreneurial plans that contain the entrepreneurial goals and missions of the university at cost and in the medium term.
- Involve alumni in entrepreneurial activities through conferences or even summer camp activities which revolve around entrepreneurship.
- Set up a structure dedicated to entrepreneurship such as the hunter center made up of early-stage investors and industry experts who have a passion for supporting student-led entrepreneurial activity.
- Encourage co-creation with students and staff.
- Participate in modern entrepreneurial competition, to strengthen the partner network.
- Made entrepreneurial activities an integral part of our engineer's education.
- embeds voluntary projects in modules and extracurricular projects as well as in research and consultancy.

CONCLUSION

The injection of the entrepreneurial concept into the university usually requires the reform or a complete transformation of the university practices. At the internal level, the organization need to establish the entrepreneurial culture first within its entities to ensure a continuous monitoring of the market and so promoting marketing research through the creation of alliances and collaborations with its environment. This paper describes a method for evaluating the capacity of universities to appraise their performance in regard to degree of application of entrepreneurial practices. The concept of entrepreneurial universities is a dynamic concept and variable, it depends on several factors including the environment; culture and altitude and he facilitate the creation of the entrepreneurial engineer.

The teaching of entrepreneurship is one of the parameters of the entrepreneurial university model but to truly succeed in the third mission, to spin out knowledge-based businesses, to create employment, and to generate socio-economic value The university must collaborate with stakeholders in its environment, particularly government and industry. The university must then react:

- Internally through its governance and its teaching method through designing of learning experiences around real-life settings, encouraging prototyping of experimentation.
- Externally in relation to its environment through collaboration, the search for investors, funds, the commercialization of research.

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BIOGRAPHICAL INFORMATION

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APPENDIX

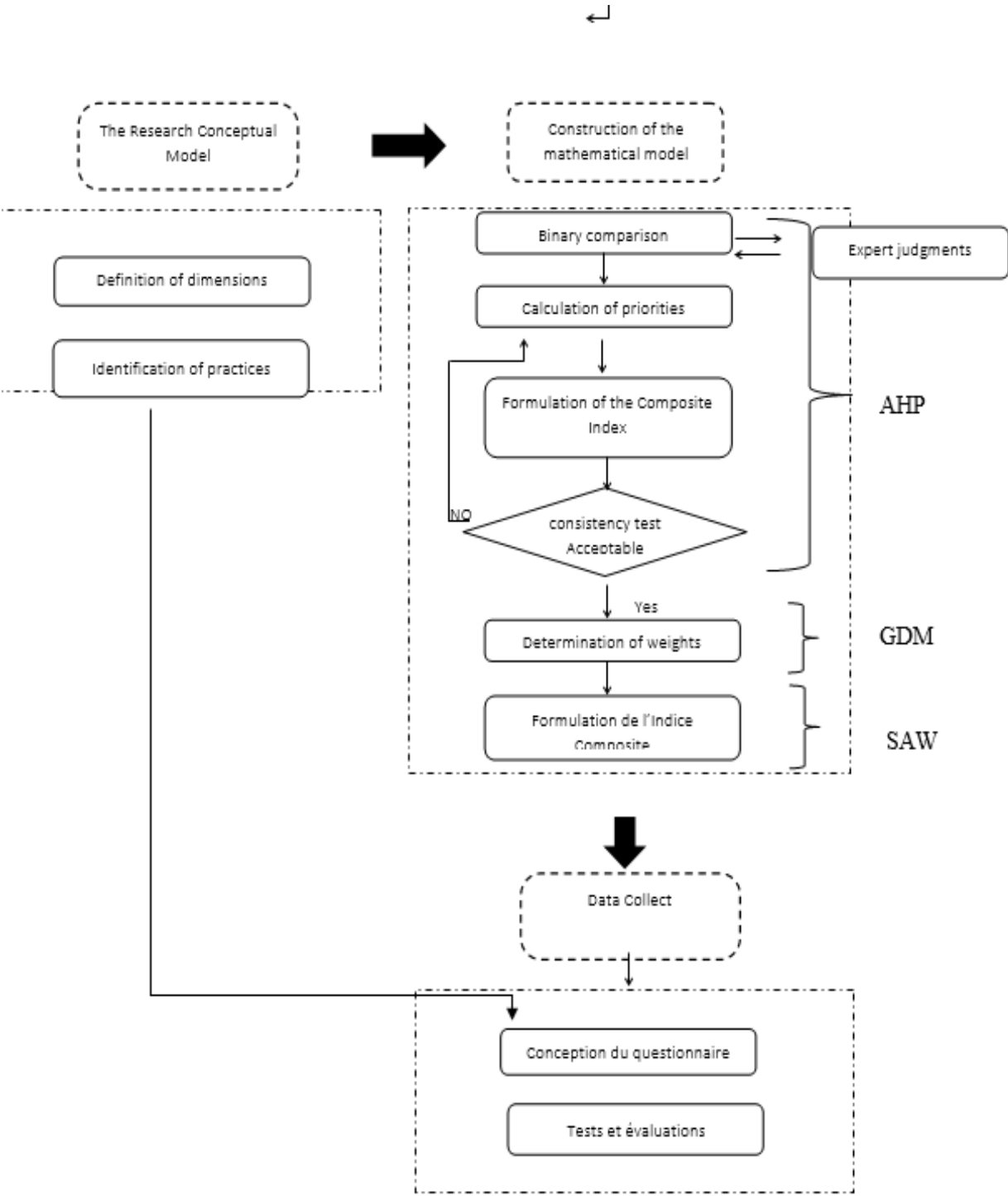


Figure i. The methodology for evaluating the entrepreneurial capacities of universities. (Ben Younes,2013)

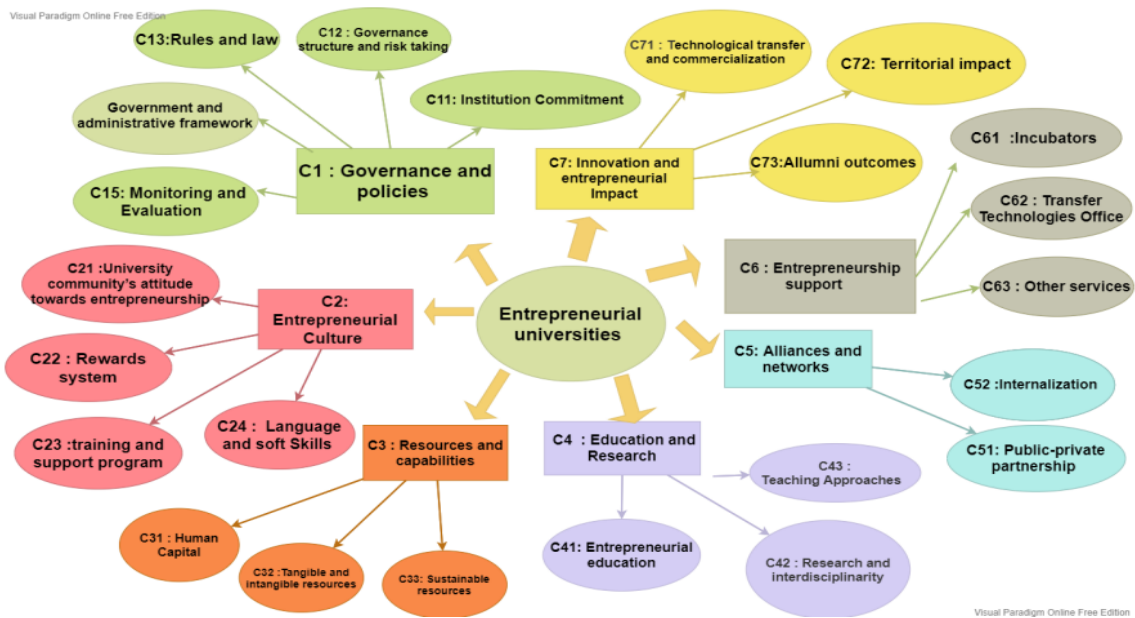


Figure ii. The Research Conceptual Model

Table i. The algorithm for calculating the composite index: Saw method (Afshari2010)

Step 1: Calculation of Individual (Local) Scores	
$S_j = \sum_{k=1}^{n_j} S_{jk} \text{ avec } k = 1, \dots, n_j$	<ul style="list-style-type: none"> • S_j: individual score at the dimension (j); • (n_j): total number of questions for dimension (j); • (S_{jk}): score associated with question (k) at the dimension (j).
Step 2: Normalization of Individual Scores	
$S'_j = \frac{S_j}{\sum_{k=1}^{n_j} S_{jkmax}} \text{ avec } k = 1, \dots, n_j$	<ul style="list-style-type: none"> • (S'_j): normalized individual score at the dimension (j) • (S_j): individual score at the dimension (j) • $(S_{jk}\{max\})$: maximum score that can be achieved for question (k) at the dimension (j).
Step 3: Calculation of the Composite Index (Global Score)	
$Scor(E_i) = \sum_{j=1}^n W'_j S'_j \text{ avec } j = 1, \dots, n, \sum_{j=1}^n W'_j = 1 \text{ et } 0 \leq Scor(U_i) \leq 1$	<ul style="list-style-type: none"> • (U_i): University (i); • (W_j): weight related to dimension (j); • (S_j): normalized individual score at the dimension (j); • (n): total number of dimensions.
$Score(U_j) < Score(U_i)$ if the university i develop more entrepreneurial than university j	

Table ii. The weighted scores and the individual scores of the ESPRIT University

Criteria	Sub-Criteria	ESPRIT
		Standardizes Score
C1: Policies and Governance	C11: Institution Commitment	0.50
	C12: Governance structure and risk taking	0.00
	C13: Rules and law	0.50
	C14: Government and administrative framework	0.00
	C15: Monitoring and Evaluation	1.00
C2: Entrepreneurial Culture	C21: University community's attitude towards entrepreneurship	0.71
	C22: Rewards system	1.00
	C23: Training and support program	0.25
	C24: Language and soft Skills	0.67
C3: Resources and capabilities	C31: Human Capital	1.00
	C32: tangible and intangible resources	0.88
	C33: sustainable resources	0.50
C4: Education and research	C41: entrepreneurial education	1.00
	C42: Research and interdisciplinarity	0.67
	C43: teaching Approaches	1.00
C5: Alliance and networks	C51: public-private partnership	0.63
	C52: Internalization	1.00
C6: Entrepreneurship measure	C61: Incubators	0.00
	C62: Technology Transfer Center	0.00
	C63: Other services	0.00
C7: Innovation and entrepreneurial impact	C71: Technological transfer and commercialization	0.25
	C72: Territorial impact	1.00
	C73: Alumni outcomes	0.25