

## Tourism Higher Education Institutions Integration in the Tourism Industry Innovation: A Quadruple Helix Approach

### The Case of the Faculty of Tourism and Hotels, Alexandria University

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#### Abstract

This study aims at presenting the model and practices needed to build a new entrepreneurial Tourism Higher Education Institutions culture to improve the process of innovation in the tourism industry depending on the new and highly recognized model of sustainable innovation the Quadruple Helix Innovation Model which based on four pillars, Academia, Government, Industry, and local community. The study also aims to explore the level of integration of the faculty of tourism and hotels Alexandria University in tourism industry innovation and determine the external and internal factors influencing the integration. Data was collected through a questionnaire presented to all the current staff members of the faculty of tourism and hotels Alexandria University in the three departments (tourism, hotels and guidance). Results reveal that the overall practices of the faculty of tourism and hotels Alexandria University in industry innovation, according to the four areas of practices; Leadership, teaching, research and community services; are weak. The weakest practices are leading fundraising and sponsorship initiatives to support the industry, establishing joint Faculty- industry advisory boards. The overall factors supporting the faculty of tourism and hotels Alexandria university integration in the tourism industry are described as weak. The weakest factor is the virtual and physical infrastructure of the faculty that does not provide an innovation stimulating environment. The study ends with recommendation for the faculty of tourism and hotels in Alexandria university best integration in the tourism industry innovation and for future researches.

**Keywords:** Innovation, Tourism Higher Education Institution, Quadruple Helix

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#### Introduction

During the last decade the term "knowledge economy" is being used more often. It stems from the full recognition of the place of knowledge and technology in the modern economy. The Knowledge based economy is the economy where success and innovation is increasingly based upon the effective utilization of intangible assets such as knowledge and skills as the key resources for competitive advantage rather than the traditional tangible wealth creating assets of land, labour and capital.<sup>(1,2,3)</sup> The new focus on the role of knowledge in economic performance has led to a growing recognition of the role the higher education institutions can play towards economic growth and social development. As a result, higher education institutions have moved from focusing exclusively on their two main missions of teaching and research, to have a leading role in economic and cultural growth, transforming themselves into engaging institutions with industry and society at large.<sup>(4,5)</sup> Etzkowitz (2003) states that 'developing countries and regions have the possibility of making rapid progress by basing their development strategies on the construction of niche knowledge sources'.<sup>(6)</sup>

Different theories of innovation emerged to define different helices for the innovation process in any industry. Quadruple Helix theory encapsulates much of the rising demand on the academia to take a more visible role in stimulating and guiding the utilization of knowledge for economic, social and cultural development. According to the Quadruple Helix theory the innovation process depends upon four helices academia-industry- government and community. The theory stresses the leading role of the academia in the innovation process for any competitive industry, their ability to produce economically useful knowledge and their relationships with their various constituencies, stakeholders and communities as a key regional actor.<sup>(7,8)</sup>

The law of higher education in Egypt (No. 94: 1972) sets a goal of higher educational institutions to build human assets with knowledge and research methods to contribute to the development. It also guarantees the independence of universities to realize the connection between higher education and the needs of society and production, which necessitate the integration of the higher institutions in industry innovation process.<sup>(9)</sup> However, different studies on higher education institutions in Egypt highlight the poor connection between higher education institutions and industry.<sup>(10,11,12)</sup> Furthermore the Organization for Economic Co-operation and Development (OECD) review of policies for higher education in Egypt (2010) reports serious problems of lack of orientation to the country's and industries' requirements and emphasizes the role the higher education institutions should play in industry innovation.<sup>(13)</sup>

This study highlights the importance of tourism higher education institutions integration with in tourism industry innovation. It presents the model and practices needed to build a new entrepreneurial tourism higher education institutions culture to improve the process of innovation in the tourism industry depending on the newest and highly

recognized model of sustainable innovation the Quadruple Helix innovation model. It also presents an analysis of the level of integration of the faculty of tourism and hotels Alexandria University in tourism industry innovation.

### **The Quadruple Helix as an Approach for Tourism Industry Innovation**

Innovation systems constitute an environment where all stakeholders collaborate and integrate to generate innovation through the interaction of knowledge and information, human resources, financial capital, and institutions.<sup>(14)</sup> Etzkowitz and Leydesdorff (1995 ;2000) proposed a model for innovation system, the Triple Helix innovation model, which depends on academia-industry-government integration to explain how the innovation could be produced in any industry in the knowledge-based economies.<sup>(15,16)</sup> This model emerged from the needs of higher education institutions to work closely together with the industry in order to improve the knowledge spillovers and to maintain the sustainable development.<sup>(17,18,19,20,21)</sup> It represents a movement towards commercialization of Knowledge. According to Afonso et al. (2010) the Triple Helix innovation process is based on three pillars, Academia, Government, and Industry, which play integrated and overlapping roles.<sup>(22)</sup> These three helices are linked together in order to develop products or services, and discover new knowledge or technology.<sup>(23)</sup>

Tourism, having its special characteristic as a social activity, encourages local communities' participation as one of the core elements of industry sustainability, development and innovation.<sup>(24,25,26,27,28,29,30,31,32)</sup> This represents a reason for arguing that the Triple Helix model is not a sufficient model for long-term sustainable tourism innovation and development.

The Quadruple Helix innovation model is a development of the Triple Helix innovation model. The Quadruple Helix model adds a fourth helix, the civil society.<sup>(33)</sup> Within the Quadruple Helix model the sustained and active interactions between firms, academia, government and civil society is a major requirement for sustainable development.<sup>(34)</sup> According to this innovation model a country's economic structure lies in the integration of these four pillars. Academia- as the center of excellence with its academic-based research and development activities- and firms, together with technological infrastructures of innovation, provide the integrated innovation environment where all forms of creativity can arise. In turn, governments provide the required regulatory system and financial support. While the civil society role appears in the areas of knowledge creation and product or service support.<sup>(35)</sup> The integration of these different actors is the core of the Quadruple Helix system that ideally will increase knowledge spillovers, thus, increasing the competitive advantage of economic development.<sup>(36)</sup>

The importance of this model of innovation has become increasingly recognized as a vital part of the tourism innovation, and positive synergy among the four different actors has been stressed as the key to sustainable innovation process.<sup>(37, 38)</sup> Agrela (2010) highlights it as the best way to assure a sustainable tourism development.<sup>(39)</sup> Bjork (2014) refers to it as the DNA for tourism innovation system.<sup>(40)</sup>

### **The Role of the Higher Education Institutions in Tourism Innovation**

The two traditional missions of higher education institutions worldwide were teaching and research.<sup>(41)</sup> The "third mission", as the new role of higher education institutions is often called, has been added to the traditional roles of higher education institutions. This third mission is always defined unclearly and seemed sometimes as a confusing concept. Most authors agree to define the "the third mission" as a residual term, encompassing all activities not covered by the first two missions of teaching and research.<sup>(42,43)</sup> However, Jongbloed et al. disagree with this approach for defining the third mission, for them, the third mission cannot simply be described as a residual term in contrast to teaching and research, on the contrary, the basic problem of analyzing the third mission is that it entails a good deal of mission overlap.<sup>(44)</sup>

Tuunainen (2005) considers that the third mission covers a wide range of activities including knowledge generation, use, application and exploitation, and also other university competences outside the academic environment.<sup>(45)</sup>

Halkier (2013) states that 'the third mission can take many forms, ranging from one-way transfer of knowledge and technology to providing relevant competencies, actively supporting entrepreneurship and participating in innovation activities'.<sup>(46)</sup> The GOODUEP (Good University-Enterprise Partnerships) project; which was financed with support from the European Commission and developed between 2007 and 2009; conclude that the third mission activities are generally gathered around three dimensions related to teaching and research. These dimensions can be defined as technology transfer and innovation, continuing education and social engagement.<sup>(47)</sup> So as contributing to innovation constitute a vital component in "the third mission" of the higher education institutions. Many activities are defined for higher education institutions roles in the innovation process including :<sup>(48, 49, 50)</sup>

- (1) Creation and transfer of knowledge which helps to define the institution's relevance with a knowledge-based society, and also produces extra income from funding opportunities and research results commercialization.
- (2) Human-capital creation to meet the needs of regional and national economy.
- (3) Knowledge infrastructure production

- (4) Encouraging and managing international links for research, knowledge transfer and innovation
- (5) Technological innovation
- (6) Influence on regional environments
- (7) Capital investment and contribution to the processes of the welfare and prosperity of their context

Leydesdorff (2010) underlines the issue of the technology commercialization process of higher education institutions resources that constitute a main transformation of higher education institutions for diversification of funding.<sup>(51)</sup>

Within the Quadruple Helix model the four helices interact in an innovative system, all have very different agendas according to their perspectives on how innovation can best be developed and the role that they play, the higher education institution's principle activity is knowledge creation, governments focus heavily on the economic and social development objectives, businesses focus on profitability and their position within the market, while social society focuses on environmental and economic concerns.<sup>(52,53)</sup> In this sense, Delman and Madsen (2007) suggest that there should be organizations which take a leading and controlling role in the Quadruple Helix structures to carry out the task of translation and coordination in the emerging fields of knowledge between the four helices.<sup>(54)</sup> They should be independent, non-profit member-based organizations which combine funding from government and private sector.<sup>(55)</sup> As so the leadership role was added to the roles of higher education institutions in the innovation process.<sup>(56,57)</sup> Halkier (2013) and Etzkowitz and Zhou (2008) emphasize the importance of the leadership role of higher education institutions as a mediating and catalyzing role in the innovation process of tourism firms.<sup>(58,59)</sup>

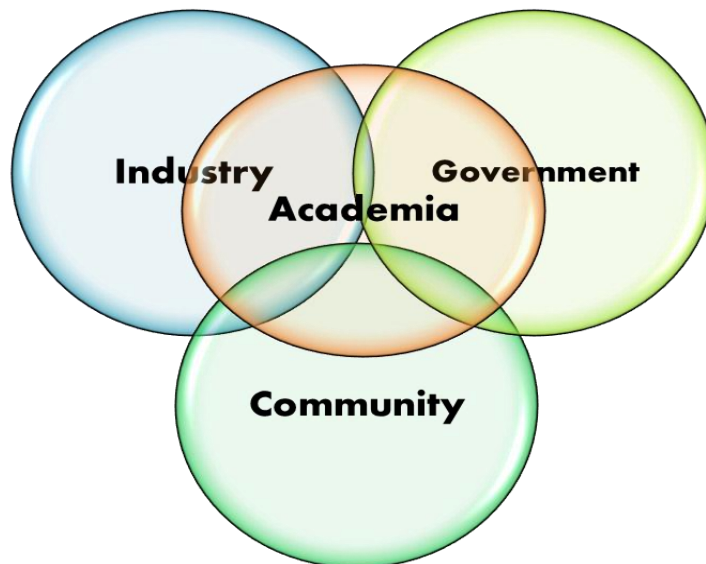
According to Etzkowitz and Zhou (2008) a higher education institution is expected to be generative and proactive, adopting some of the traditional roles of industry and government, and contributing to the industry in a number of ways. For example, academics may influence firm formation through providing advisory services while retaining a permanent position at a university.<sup>(60)</sup> Another example of leadership activity involves the promoting of personnel flow across the different helices by the so-called 'professors of practice' that help bridge the academia-industry gap.<sup>(61)</sup>

Delman and Madsen (2007) define other roles for higher education institutions within the Quadruple Helix, they create networks and build partnerships and associations to undertake research and development (R&D), implement shared-cost R&D programs, build R&D Infrastructures, supply technical products and services, contribute to a national cross-sectoral vision of R&D excellence, and develop, attract and retain highly qualified people.<sup>(62)</sup>

Lindqvist et al. (2012), after considering several case studies, identify four distinct levels of engagement of higher education institutions with their region's development. The first when a single higher education institution exists in a peripheral region, it takes a major role in encouraging local entrepreneurship and in transferring science and technology with a monopoly situation. The second is multiplayer higher education institutions in peripheral regions outshining in forming regional consortia for development, creating promotion and cultural networks, contributing to the sustainable development of the region through strategic planning and knowledge transfer. Finally, the newer technologically-oriented higher education institutions in core regions, they contribute to the regeneration of cities and spreads their activities to non-traditional students.<sup>(63)</sup>

To conclude the types of practices considered for the modern higher education institutions according to the Quadruple Helix innovation model relate to research and knowledge transfer, teaching/education, innovation leadership, and cultural and social engagement within an integrated environment where synergism is very critical to achieve a sustainable innovation environment. We can present the relations between the four helices of the Quadruple Helix innovation model according to their role in the industry innovation in figure (1).

According to the figure the academia plays the major and central role in the process. It takes the role of innovation leadership and integrates with the other helices in the industry innovation practices. Halkier (2013) asserts that this new collaborative arrangement raises challenges for those in charge of the tourism higher education institutions.<sup>(64)</sup>



**Figure 1: Quadruple Helix Innovation Model (Harb, 2014)**

### **Factors Influencing Tourism Higher Education Institutions Integration in the Tourism Industry Innovation**

The effective integration of tourism higher education institutions in the industry innovation requires a new innovative environment which has influence on the functioning of the system. Boucher et al. (2003) propose that the level of engagement by a higher education institution in its region's development will depend on the type and size of the institution itself and the type and size of the region where it exists.<sup>(65)</sup>

Etzkowitz (1997) asserts that the level and type of academia intervention in an area necessitate a high level of science and technology policy capacity for the state, industry and academia.<sup>(66)</sup>

According to Sedziuviene et al. (2009) the role of a higher education institution in the modern knowledge society requires a new innovative view of knowledge management and creation that determine learning as non-stop process that combines "learning before" and "learning after". Also the cultural environment of the organization will have an influence on the functioning of the system.<sup>(67)</sup>

Mohammed (2004), in his study of the efficiency of the education system in Assuit University according to the modern university variables, defines a set of variables that impose efficiency standards, including efficiency of the educational process, skills possessed by graduates, access to community and local community participation.<sup>(68)</sup>

For Etzkowitz and Zhou (2008) the main factors in creating an entrepreneurial higher education institution are internal culture and external environment particularly the industrial environment.<sup>(69)</sup>

The most comprehensive study to define the factors influencing an innovation enabling academia environment was developed by Ayadi and Escarre.<sup>(70)</sup> They distinguish between factors within the academia and factors outside the academia. Factors within the academia include the virtual and physical infrastructure as main drivers for adopting an innovation culture, the management style, the organizational strategy, and the involvement of all actors, the protection of research results and intellectual property, focusing on innovation in education and training, policies and regulations, and capacities of the human resources. Factors outside the academia include the business environment, the regulatory system, the financial support provided by governments, the civil society's support and demand for innovating services, and the increasing interaction with other organizations and institutions at the international level. Of all these factors, stress is put on the physical and virtual infrastructure of the institution, the human resources of the institution, including students and staff (academic, research, administrative and management staff), their level of involvement in the decision-making processes, their participation in research and entrepreneurial activities, the quantity and quality of the training they receive and the institution management and strategy.<sup>(71)</sup>

### **Research Aims**

This part of the study aims to explore the level of integration of the faculty of tourism and hotels Alexandria University in tourism industry innovation, by assessing the practices of faculty in the four areas of; innovation leadership, teaching, research, and community service. It also aims to determine the external and internal factors influencing the integration of the faculty of tourism and hotels Alexandria University in tourism industry innovation.

### **Research Hypotheses**

H1- The faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation

H1a- The faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation according to the innovation leadership practices

H1b- The faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation according to the teaching practices

H1c- The faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation according to the research practices

H1d- The faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation according to the community service practices

H2- The Factors influencing the integration in the industry innovation in the faculty of tourism and hotels Alexandria University do not support its integration in tourism industry innovation.

## Research Methodology

### Data Collection

Data was collected through a questionnaire presented to all the current staff members of the faculty of tourism and hotels Alexandria University in the three departments (tourism, hotels and guidance). The questionnaire was developed based on literature review. It was presented to an exploratory sample of six experienced professors and their observations were used to prepare the final form of the questionnaire. Questionnaires were filled out through e-mails, interviews, and telephone calls, resulting in a response rate of 80.6 %. (29 valid questionnaires out of total 36 divided between 3 departments as shown in table one). Data collection took place during the period of October - November 2014.

**Table (1) research sample**

Department	N	total population	% of total population	% of total sample
Tourism	9	12	75	31.0
Hotels	10	12	83.3	34.5
Guidance	10	12	83.3	34.5
Total	29	36	80.6	100.0

- Descriptive analysis is used to draw a picture of the faculty of tourism and hotels Alexandria university integration in tourism industry innovation. Mean and Std. Deviation are calculated to assess the integration practices in the faculty of tourism and hotels Alexandria university as well as the factors influencing the integration
- Analysis of variance (ANOVA) test is used to analyze the differences between the responses of the three departments (tourism, hotels and guidance).
- Post-hoc analysis using Fisher's Least Significant Difference (LSD) is used to compute the pooled standard deviation from all the three groups
- The department Cross tabulation process is used to summarize data collected from the responses of the three departments related to the item with significant difference to create a contingency table
- Finally, the chi - square test is used to determine the significance of the research hypotheses.

### Reliability Statistics: Cronbach's Alpha 0.928

### Results

#### Faculty of Tourism and Hotels Integration Practices in Tourism Industry Innovation

Respondents were asked to assess the faculty practices under the four main areas: industry innovation leadership, teaching, research and community service using 5 Likert scale between (very strong- and very weak) results are shown in table (2).

**Table (2) Mean, Std. Deviation and evaluation of integration practices**

<b>Activity</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Evaluation</b>
<b>A- Leading Industry Innovation</b>			
1- Establishing joint faculty- industry advisory boards (for problem solving, scientific advice etc...)	1.4483	.73612	v. weak
2- Preparing industry service centers to do professional training courses	2.6207	1.34732	neutral
3- Contributing to the development of various technologies, ideas in the industry	2.3448	1.39581	weak
4- Participating in the development plans and making the future of tourism	1.6897	.96745	v. weak
5- Working to dissolve the differences between stakeholders in the tourism industry	1.7931	.94034	v. weak
6- Creating international links with the industry' institutions and enterprises	2.4138	1.08619	weak
7- Creating local, national links with industry, institutions and enterprises	2.6552	1.56470	neutral
8- Directing authors to non-students scientific books	1.7586	.95076	v. weak
9- Promoting communications and structured partnership with and between the other three helices (industry- government- community)	1.8276	.96618	weak
10- Leading industry governance strategy	1.5862	.98261	v. weak
11- Leading fundraising and sponsorship initiatives to support the industry	1.2759	.52757	v. weak
12- Cooperating in the organization of special events to promote the tourism	2.3103	1.53770	weak
<b>B- Teaching</b>			
1- Providing world class and competence-based learning in the three-cycle system (Bachelor-Master-Doctorate)	3.0345	.94426	Neutral
2- Providing adult education of all ages (continuing education) for professionals	3.6552	1.34366	Strong
3- Holding seminars, symposia and scientific conferences for graduates (in order to become familiar with all introduce in their respective fields).	2.3103	1.39139	Weak
4- Holding specialized training courses	3.0000	1.36277	Neutral
5- Providing scholarships	2.5172	1.29892	Weak
6- Providing programs to raise the productive efficiency of the faculty staff	2.3793	1.14685	Weak
7- Providing the basic requirements of the faculty professor	2.7241	1.36006	Neutral
8- Providing scientific references and sources constantly	3.4828	1.24271	Strong
9- Organizing field visits to work sites for students and teachers	3.3448	1.23276	Neutral
<b>C-Research</b>			
1- Conducting scientific research to achieve efficiency and to solve a problem of the industry	3.6552	1.49465	Strong
2- Commercializing the research to exploit research results	2.4138	1.50041	Weak
3- Interpretation and dissemination of the research results	2.5172	1.32613	Weak
4- Protecting intellectual property rights, patents and licenses	3.9310 3.3448	1.03272 1.36998	Strong Neutral

5-Organizing conferences to promote research in the industry			
6-Encouraging industry -academia partnership in research	2.4138	1.47642	Weak
<b>D- Community Service</b>			
1-Spreading awareness in the community	2.8276	1.22675	Neutral
2-Posting the faculty in various social events	2.3448	1.00980	Weak
3-Strengthening the values of social responsibility of the students.	2.4828	1.18384	Weak
4-Participation of the faculty, students and staff in the field of volunteer public service to the community.	2.3103	1.137151	Weak
5-Conducting comprehensive environmental research that addresses some of the overlapping community problems	2.0690	.30742	Weak
6-Providing financial support for the institutions of the local community	2.1379	1.18696	Weak

According to the respondents most of the practices are weak. The weakest practices are leading fundraising and sponsorship initiatives to support the industry (1.2759), establishing joint faculty- industry advisory boards (for problem solving, scientific, advice etc.) (1.4483), leading industry governance strategy (1.5862), participating in the development plans and making the future of tourism (1.6897), directing authors to non-students scientific books (1.7586) and promoting communications and structured partnership with and between the other three helices (industry-government- community) (1.8276). Strong practices are protecting intellectual property rights, patents and licenses (3.9310), providing adult education of all ages (continuing education) for professionals (3.6552), conducting scientific research to achieve efficiency and to solve a problem of the industry (3.6552), and providing scientific references and sources constantly (3.4828). As it is shown in table (3) the practices of the faculty of tourism and hotels Alexandria University in the areas of leading industry innovation and community service are weak and the overall practices of the faculty of tourism and hotels Alexandria University in industry innovation according to the four areas are weak.

**Table (3) Mean, Std. Deviation and Evaluation for the main areas of integrating practices**

Items	Mean	Std. Deviation	Evaluation
<b>A- Leading Industry Innovation</b>	1.9775	1.085	Weak
<b>B- Teaching</b>	2.937778	1.256667	Neutral
<b>C-Research</b>	3.045	1.366667	Neutral
<b>D- Community Service</b>	2.361667	1.176667	Weak
<b>Total</b>	2.580486	1.22125	Weak

These results reflect that the faculty of tourism and hotels does not carry out its role in the tourism industry innovation according to the Quadruple Helix model effectively. It is not integrated with the other helices within the four areas of practices. The Faculty practices in innovation leadership are the weakest which should be a central role of the faculty according to the model. Its practices in the area of community services are weak too which should be a main role of the faculty according to the modern third mission of the academia. The respondents ranked their practices in the areas of teaching and research as neutral which means that they are not sure about the quality of their practices in these areas and also reflects shortcomings in the faculty practices in these two areas.

#### **Differences in the evaluation of faculty integration practices according to the departments**

Anova test is used to determine the differences in the evaluation of faculty integration practices between the three departments in the four areas leading Industry Innovation (F1), Teaching (F2),

Research (F3) and Community Services (F4). Results are shown in table (4).

According to the table there is a significant difference in the responses in the area of community service practices. Least Significant Difference (LSD) is used to compute the pooled standard deviation from the entire three departments in the area of community service. Results are shown in the table (5).

**Table (4) ANOVA Test difference in integration practices according to departments**

		Sum of Squares	Df	Mean Square	F	Sig.
f1	Between Groups	.200	2	.100	.184	.833
	Within Groups	14.187	26	.546		
	Total	14.387	28			
f2	Between Groups	.438	2	.219	.399	.675
	Within Groups	14.268	26	.549		
	Total	14.706	28			
f3	Between Groups	1.029	2	.514	.881	.427
	Within Groups	15.188	26	.584		
	Total	16.216	28			
f4	Between Groups	5.650	2	2.825	4.402	.023
	Within Groups	16.687	26	.642		
	Total	22.337	28			

**Table (5) LSD deviation from the entire three departments in the area of community service**

Dependent Variable (J) Department	(I) Department		Mean Difference	Std. Error	Sig.
			(I-J)		
Community Service	Tourism	Hotels	.37593	.36809	.317
		Guidance	-.67407-	.36809	.079
	Hotels	Tourism	-.37593-	.36809	.317
		Guidance	-1.05000*	.35827	.007
	Guidance	Tourism	.67407	.36809	.079
		Hotels	1.05000*	.35827	.007

Result show that there is a significant difference in the responses of the guidance department members in the area of community service.

To define the direction of this difference between the departments Cross Tabulation process is used. Results are shown in table (6).

**Table (6) Community Service \* Department Cross tabulation**

		Department		
		Tourism	Hotels	Guidance
Community Service	Very weak	13.3%	13.3%	2.9%
	Weak	5.4%	14.2%	12.4%
	Neutral	3.9%	6.3%	7.5%
	Strong	5.3%	0	9.9%
	Very Strong	2.4%	0.4%	3.4%
Total		31.0%	34.5%	34.5%

According to the results differences in the responses of the guidance department members in the area of community service are directed towards the sides of strong and very strong. It means that according to the responses of the guidance department members they take a greater role in the industry innovation in the area of community services where they ranked their practices between strong and very strong which reflects a positive side in the practices of the guidance department.



**Factors influencing the faculty of tourism and hotels Alexandria university integration in the tourism industry innovation**

Respondents were asked to assess the factors influencing the faculty of tourism and hotels Alexandria university integration in tourism industry using 5 Likert scale between (very strong- and very weak) results are shown in table (7)

**Table (7) Mean, Std. Deviation and Evaluation of the Factors influencing the faculty of tourism and Hotels Alexandria university integration**

<b>Factors</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Evaluation</b>
1- The virtual and physical infrastructure of the faculty provides an innovation stimulating environment	1.8621	1.12517	Weak
2- There are knowledge transfer offices within the faculty with up-to-date industry contacts	1.6897	.96745	V. Weak
3- The Strategy of the faculty reflects openness to innovation and favor the incentives for entrepreneurship	2.1034	1.34549	Weak
4- The faculty strategy facilitates investment in research and development	2.1034	1.26335	Weak
5- There are greater emphasis on skills, creativity and training and industry requirements in the different academic programs	2.6552	1.04457	Neutral
6- The research staff conduct their research in interaction with public-sector as well as private-sector	2.6897	1.19832	Neutral
7- The Management staff assists students /researchers in seeking cooperation with enterprises, organizations and institutions within the industry	2.4828	.94946	Weak
8- Funding opportunities for research and innovation initiative are easily accessible to researchers	2.4828	1.18384	Weak
9- The Legal Structure provides protection for intellectual property	2.6552	1.31681	Neutral
10- The Legal structures within the faculty promote collaboration and foster access to research resources and industry partners	3.0000	1.58114	Neutral
11- The industry enterprises provide paths for integrations	2.4483	1.45372	Weak
12- The attributes of the faculty staff such as previous experience in research collaborations with industry, academic status, age and attitude support the integration in industry innovation	2.2759	1.27885	Weak
13- The industry institutions seek and support partnership with the Faculty.	2.3448	1.56470	Weak
14- The governmental organizations seek and support partnership with the faculty	2.1379	1.12517	Weak
15- Local community culture and organizations support partnerships with the faculty	1.9310	1.16285	Weak
<b>Total</b>	<b>2.324147</b>	<b>1.237393</b>	<b>Weak</b>

According to the respondents most of the factors influencing the faculty of tourism and hotels Alexandria university integration in the tourism industry innovation are weak. The weakest factors are There are knowledge transfer offices within the faculty with up-to-date industry contacts (1.6897), The virtual and physical infrastructure of the faculty provides an innovation stimulating environment (1.8621), Local community culture and organizations support partnerships with the faculty (1.9310), the strategy of the faculty reflects openness to innovation and favor the incentives for entrepreneurship, and the faculty strategy facilitates investment in research and development (2.1034)

Finally, The overall responses on the factors influencing the faculty of tourism and hotels Alexandria university integration in tourism industry innovating are described as weak.

These results mean that the faculty of tourism and hotels does not have an enabling environment for the integration in industry innovation and also provide justifications for its weak practices in the four areas of integration. Lacking virtual and physical infrastructure adversely affects the faculty practices in the areas of teaching and research.

It does not provide an innovation stimulating environment where stress has been put mainly on this factor according to the model. Lacking knowledge transfer offices with up-to-date industry contacts impedes communications with industry, innovation Leadership, and research results transfer and commercialization which are main roles for academia according to the model. The strategy of the faculty which doesn't reflect openness to innovation or favor the incentives for entrepreneurship is also a main obstacle for the effective integration. The external factors with weak rating especially the local community culture and organizations that do not support partnerships with the faculty also explain the faculty weak practices especially in the area of community service.

### Hypotheses Testing

Chi-square test is used to test the hypotheses. It tests what scientists call the null hypothesis and a claim is shown to be valid by demonstrating the improbability of the counter-claim that follows from its denial. Results are shown in table (8).

**Table (8) chi- square test**

The hypotheses	chi- square test	p-value
H <sub>1,A</sub>	3.415	0. 153
H <sub>1,B</sub>	2.321	0. 422
H <sub>1,c</sub>	6.421	0. 231
H <sub>1,D</sub>	1.714	0. 125
H <sub>2</sub>	2.217	0. 311

For H1A (The faculty of tourism and hotels Alexandria University is not integrated in the tourism industry innovation according to the innovation leadership practices). As the p-value is 0. 153 accept the null hypothesis, the faculty of tourism and hotels Alexandria University is not integrated in the tourism industry innovation, according to Leadership activities, and the alternative is rejected.

For H1b (The faculty of tourism and hotels Alexandria University is not integrated in the tourism industry innovation according to the teaching practices) as the p-value is 0. 422 so the null hypothesis is accepted, the faculty of tourism and hotels Alexandria University is not integrated in the tourism industry innovation according to the teaching practices, and the alternative is rejected

For H1c (The faculty of tourism and hotels Alexandria University is not integrated in the tourism industry innovation according to the research practices). As the p-value is 0. 231 so the null hypothesis is accepted, the faculty of tourism and hotels Alexandria University is not integrated in the tourism industry innovation according to the research practices, and the alternative is rejected

For H1d (The faculty of tourism and the hotels Alexandria University is not integrated in the tourism industry innovation, according to the community service practices). As the p-value is 0. 153 so the null hypothesis is accepted, the faculty of tourism and the hotels Alexandria University is not integrated in the tourism industry innovation, according to the community service practices, and the alternative is rejected. These results lead to accepting H1 that faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation

**For H2** (Factors influencing the integration in the industry innovation in the faculty of tourism and hotels Alexandria University do not support its integration in tourism industry innovation) as the p-value is 0. 311 the null hypothesis is accepted and the alternative is rejected.

We can conclude that the faculty of tourism and hotels Alexandria University is not integrated in tourism industry innovation according to the Quadruple Helix innovation model. And the overall factors influencing the integration in the faculty do not provide an enabling environment for integration. The results reflect a critical situation of the faculty, which should be considered in order to improve its current practices in the four areas of innovation and provide stimulating environment for the effective integration.

### Conclusion

The rising recognition of the place of knowledge in the modern economy has led to a growing international recognition of the role the higher educational institutions can play towards economic growth and industry innovation. This study aims at raising the awareness of the importance of the role the tourism higher education institutions can play in tourism industry innovation depending upon the Quadruple Helix innovation model. The review highlights the role of tourism higher education institutions in tourism industry innovation, which is categorized under four main areas; innovation leadership, teaching, research and community service; revealing that these areas are interrelated. The review also highlights the internal and external factors that positively or negatively influence the integration of tourism higher education institutions in the tourism industry innovation. The research further explores the integration of the faculty of tourism and hotels Alexandria University in the tourism industry innovation. Results reveal that the overall practices of the faculty of tourism and hotels Alexandria University in industry innovation within the four areas are weak. The weakest practices are leading fundraising and sponsorship initiatives to support the industry, establishing joint faculty-

industry advisory boards (for problem solving, scientific advice... etc.), leading industry governance strategy and participating in the development plans and making the future of tourism. While strong practices include protecting intellectual property rights, patents and licenses, providing adult education of all ages (continuing education) for professionals and conducting scientific research to achieve efficiency and to solve a problem of the industry. Result also show that there is a significant difference in the responses between the three departments of the faculty related to the responses of the guidance department members in the area of community service directed towards strong and very strong assessments. The overall factors influencing the faculty of tourism and hotels Alexandria university integration in the tourism industry are described as weak. The weakest factors are the availability of knowledge transfer offices within the faculty with up-to-date industry contacts and the virtual and physical infrastructure of the faculty that provide an innovation stimulating environment.

For the faculty of tourism and hotels Alexandria University, it is clear that important conditions for the effective integration in the tourism industry innovation should be met. It is highly recommended to understand that fundamental changes should take place in the practices of the faculty in order to make a full contribution to the innovation in the tourism industry. The development of the virtual and physical infrastructure is essential to provide an innovation enabling environment. The faculty relationship with external partners should be best enhanced by establishing support for the following areas:

- \* Changes within the internal environment such as strategy, values, attitudes and levels of involvement of different stakeholders seem to be fundamental
- \* Efforts for supporting knowledge Transfer, regional networking, and business development are important
- \* Encouraging the commercialization of research ideas
- \* Staff development in income generation activities through advisory boards, seminars and workshops, and operating the faculty's rewards and incentives policy
- \* Seeking community support and partnership through regular meetings and workshops
- \* Creating networks with the relevant governmental institutions at various levels
- \*Emphasize on skills, creativity and training and industry requirements in the different academic programs

The study faced many limitations, including lack of specialized literature and time limitations. However, the study defines the way to the successful integration of tourism higher education institutions in the tourism industry. Further studies should be made to assess the integration of other tourism higher education institutions to support the innovation of the industry on the national level.

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