

## University-Industry Linkages: an Analysis from the Research Community's Perspective at Biskra University

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**Received:** 07/04/2020 ; **Revised:** 09/07/2020; **Accepted:** 19/09/2020

**Summary:** This paper aims at highlighting the university-university linkages conceptualized under the Triple Helix Model-THM at the University of Biskra in Algeria based on a survey analysis from the point of view of research community during the period of (June-November 2019). We have received about 138 answers from a sample of 406 elements of all university departments where the majority of responses confirm that there is no official linkages with the industry but the community of research want to create new ones. The paper concludes with recommendations for academics and practitioners and provides several directions for future research.

**Keywords:** University-Industry Linkages; Triple Helix Model; Analysis; Biskra's University; Algeria.

**Jel Classification Codes :** O31, O32, O38.

### I- Introduction :

The research university plays an important role as a source of fundamental knowledge and, occasionally, industrially relevant technology in modern knowledge-based economies. In recognition of this fact, governments throughout the industrialized world have launched numerous initiatives since the 1970s to link universities to industrial innovation more closely. Many of these initiatives seek to spur local economic development based on university research (Souleh, 2015, p46)<sup>1</sup>.

In developed countries, universities, increasingly, have come to play an important role in producing original knowledge that often has commercial applications. Universities have been recognized as one of the main actors who directly or indirectly help make a nation more innovative (Datta and Souleh, 2018, p296)<sup>2</sup>.

The management literature indicates that little has been written on how knowledge transfers between universities and industry actually occur or the obstacles that are encountered in facilitating these transfers (Siegel et al., 2004, p117)<sup>3</sup>. Later on, the potential for universities to contribute positively to business innovation has received much attention in recent years. While the determinants of university-business cooperation have been examined extensively, less attention has been given to the mediating influence of proximity in this relationship (Hewitt-Dundas, 2013<sup>4</sup>).

The development of collaborative linkages with universities has been shown to have a positive effect on firms through increasing their sales, research productivity and level of patenting through allowing to access additional resources, promoting learning within the firm and broadening the scope of their activities. Therefore, policymakers worldwide are increasingly pushing universities towards developing industry linkages and commercialising their knowledge (Johnton, and Huggins, 2017, p05)<sup>5</sup>. In light of these findings, many universities established technology transfer offices (TTOs) to manage and protect their intellectual property. The role of the TTO is to

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facilitate commercial knowledge transfers through the licensing to industry of inventions or other forms of intellectual property resulting from university research (Siegel et al., 2004, p116)<sup>6</sup>.

As knowledge becomes an increasingly important part of innovation and other industrial activities, the university as a knowledge-producing and disseminating institution plays a larger role in industrial innovation. Therefore, in a knowledge-based economy, the university becomes a key element of the innovation system both as a provider of human capital, innovation capabilities, innovation building capacity and seed-bed of new firms and startups which relate evently three actors: University, industry and government in a business climate. (Etzkowitz, et al, 2000, pp 315-316)<sup>7</sup>.

University–industry collaboration is often pursued in an informal and decentralized manner. However, increasingly, firms are adopting a more strategic approach to their collaborative work with industry while universities are seeking to streamline and reinforce their industry collaborations by establishing centres specializing in certain subjects areas with single or multiple corporate sponsors. For example, the aerospace company Rolls Royce has established about 30 University-Technology Centres at multiple universities to source subject-specific expertise from best-of-breed departments. Likewise, the pharmaceutical company, GlaxoSmithKline, has implemented a variety of initiatives, ranging from open-science collaborations involving competing pharmaceutical companies to more exclusive oneto- one relationships with specific university departments (Perkmann et al. 2011, pp203-204)<sup>8</sup>.

Universities take advantage of knowledge spillovers from their laboratories to the market for both economic development and financial gains (Kim, 2013<sup>9</sup>). However, as the sourcing of knowledge from universities is being transformed from decentralized, informal adhoc cooperation to large-scale, multi-annual alliances firms are having to recognize that there is a need for more systematic evaluation and measurement both to assess initiatives posteriori, but even more importantly, to monitor ongoing initiatives to enable adjustment and improvement (Perkmann et al. 2011, p203<sup>10</sup>).

Since the independence, Algeria has known many reforms in its higher education system and scientific research sector and has established many institutions and launched many laws that motivate the linkages between the education and research institutions and its social and economic environment.

This study aims to examine *the linkages between the University of Biskra and the industry conceptualized under the Triple Helix Model-THM from the research community perspective.*

To answer this problematic, we highlight theses Hypotheses:

**H<sub>1</sub>:** *Based on the Triple Helix Model-THM, the University of Biskra has strong and official linkages with the industry.*

**H<sub>2</sub>:** *The research community in Biskra's university is aware of the importance of the collaboration with the social and economical sector as both entities are essential elements in the Triple Helix Model-THM .*

To answer the problematic and test the hypothesis, we structured our paper in the following way. First, a theoretical part is carried out to define university and industry linkages. Second, an explanation about the methodology used and how the data was collected, and then an analysis and a discussion about the data collected were carried out based on the first results of a survey about the university-industry linkages in Biskra's University from the research community' point of view. In the final section suggestions and recommendations about University-industry linkages are given then we conclude with testing the hypotheses, study limitation and future direction of research.

### **I.1. University-Industry Linkages-UILs**

Over the past two decades, motivated by fiscal constraints and stiffening international economic competition, numerous policymakers have, however, effectively eschewed the linear model as they have encouraged universities and government labs to embrace the cause of technology commercialization. Reflecting the sentiment that public research is too distant from industry in the majority of industries (with the notable exception of biomedical research), policymakers have called on universities and government R&D labs to make their science and engineering more relevant to industry's needs (Cohen et al., 2002, p02)<sup>11</sup>.

After 1970's, the University-Industry Linkages (UILs) emerged on agenda of policy institutes and researchers of several developed nations. For example, National Science Foundation funded University and Industry Cooperative Research Projects Program. As this interaction became common, different types of linkages amongst the three stakeholders: University-Industry-Government (UIG) also evolved in the literature of Science Technology and Innovation Studies (STIS) which started at the middle of the last century (Bhutto, and Lohana, 2018, p42)<sup>12</sup>.

The UILs can be seen through the research capacities of individual academic researchers which provide a more direct explanation of government centrality to academic researchers' industry involvement than provide either the resource-based or institutional view (Boardman, 2009)<sup>13</sup>. Therefore, the new views of university technology transfer are: Academic entrepreneurship, open innovation, collaborative views (Bradley et al., 2013, pp51-63)<sup>14</sup>. Universities, today, are not only collaborating with the industry through technology transfer, but are also undertaking entrepreneurial activities themselves (Reddy, n.d, p26)<sup>15</sup>.

Most research in Africa including Algeria is conducted at universities, placing these institutions at the centre of their national innovation systems. Through research and extension services, African universities can play a central role in producing technical solutions to local challenges. Yet, across much of Africa, universities have minimal linkages with the productive sector at every level, from big industry, to agricultural producers, to medium-and-small scale enterprises. Relatively few African universities manage technology incubators or science parks at their institutions (Ssebuwufu et al, 2012<sup>16</sup> ; Souleh, 2015<sup>17</sup>).

The UILs activities can strongly raise the employability of students, in particular student internships in companies followed by joint projects and the involvement of companies in modernizing university curricula. Adoption and diffusion internship strategies are suggested for foreign companies and for local firm, respectively, as vehicles for increasing employability (Ishengoma and Vaaland, 2016, p18)<sup>18</sup>.

The various UILs take many forms, such as licensing of university intellectual property for commercial purposes to joint R&D activities (Plewa et al., 2013, p23)<sup>19</sup>, consulting services provided by professors in firms plays a critical role in facilitating knowledge co-creation between practice and knowing (Chen et al., 2013)<sup>20</sup>, internships, and other collaborations between firms and Universities to develop a product or technology (Rahali and Bendiabdellah, 2015, p215)<sup>21</sup>. Recent categorizations address the intensity of relational involvement. In comparison to research services, which require little or no relational engagement, UILs create a networked organizational structure, because the two separate partners engage in designated research tasks, both with independent objectives yet a high level of reliance on the other party. This status implies the need for a relational approach to initiating and managing UILs (Plewa et al., 2013, p23)<sup>22</sup>.

UILs can take ten types of channels which are divided into five formal- and five informal channels. Formal channels include collaborative research, intellectual property transactions, research mobility, academic spin-offs and university graduates joining industry. Informal channels include research publications, conferences and networking, facility sharing and the continuing education of company employees (Kaloudis, et al., 2019, p35)<sup>23</sup>.

In general the university-industry linkages can take one or more of the followings forms of collaboration: Consulting, joined research, R&D, co-supervision of PhD and Master thesis, professional diploma like: Matser-pro, Master Business Administration-MBA, patents, technology transfer, spin offs... etc.

What it is acknowledged nowadays, is that one of the crucial success factors in the management of UILs is the availability of an institutional strategy for the development of such relations, for instance laid down in a strategic planning document, a development plan or any other written statement of policy (Martin, 2000, p35)<sup>24</sup>.

UILs express the relationship between manufacturing / service industry and higher educational institutions. There are expectations of industry regarding the right employee for the right job, to be fulfilled by educational institutions. Teaching and training are two sides of the education 'coin', as proposed in the helix model of actors, organisational structures, rules and regulations (Varghesea and Gurumoorthy, 2020)<sup>25</sup>.

## **I.2. Triple Helix Model-THM: Conceptual framework:**

The concept of the Triple Helix of university–industry–government relationships initiated in the 1990s by Etzkowitz (1993) and Etzkowitz and Leydesdorff (1995), encompassing elements of precursor works by Lowe (1982) and Sábato and Mackenzi (1982), interprets the shift from a dominating industry–government dyad in the Industrial Society to a growing triadic relationship between university, industry and government in the Knowledge Society (Etzkowitz and Ranga, 2013)<sup>26</sup>.

The Triple Helix literature has been developed over the last two decades that can be viewed from two complementary perspectives .First, there is the(neo-) institutional perspective, which examines the growing prominence of the university among innovation actors through national and regional case studies. These studies look at various aspects of the university's 'third mission' of research commercialization and involvement in socio-economic development, such as forms, stakeholders, drivers, barriers, benefits and impact, university technology transfer and entrepreneurship, contribution to regional development, government policies aimed to strengthen university–industry links (Etzkowitz and Ranga, 2013)<sup>27</sup>.

The (neo-) institutional perspective distinguishes between three main configurations in the positioning of the university, industry and government institutional spheres relative to each other (see Figure 1) (Etzkowitz and Leydesdorff, 2000)<sup>28</sup>:

(1) *A statist configuration*, in which government plays the lead role, driving academia and industry, but also limiting their capacity to initiate and develop innovative transformations;

(2) *A laissez-faire configuration*, characterized by limited state intervention in the economy, with industry as the driving force and the other two spheres acting as ancillary support structures with limited roles in innovation – universities acting mainly as providers of skilled human capital and government mainly as a regulator of social and economic mechanisms;

(3) *A balanced configuration*, specific to the transition to a Knowledge Society, in which university and other knowledge institutions act in partnership with industry and government and even take the lead in joint initiatives.

The second of the two perspectives is the neo-evolutionary perspective, inspired by the theory of social systems of communication and the mathematical theory of communication. From this perspective, university, industry and government are co-evolving sub-sets of social systems that interact through an overlay of recursive networks and organizations that reshape their institutional arrangements through reflexive sub-dynamics, such as markets and technological innovations. These interactions are part of two processes of communication and differentiation: a function alone, between science and markets, and an institution alone, between private and public

control at the level of universities, industries and government, which allow various degrees of selective mutual adjustment (Etzkowitz and Ranga, 2013)<sup>29</sup>.

In addition, internal differentiation within each institutional sphere generates new types of links and structures between the spheres, such as industrial liaison offices in universities (these kind of institutions is not really active in the case of Algerian universities) or strategic alliances among companies, creating new network integration mechanisms. The interactions between the Triple Helix actors can be captured by specific indicators (such as bibliometrics, patent indicators) that can provide insights into trends and patterns of public-private cooperation, its geographical concentrations and implications. Both these perspectives have an implicit, underlying systemic dimension of Triple Helix interactions originating from their vision of such interactions as manifestations of social systems characterized by action (Etzkowitz and Ranga, 2013)<sup>30</sup>.

While it has become quite commonplace for universities in developed countries to conduct original research and occasionally undertake its commercialization, this trend is not well pronounced in most developing nations. Policy-makers, economists and other scholars often consider this condition as a problem that needs to be redressed and exhort universities in developing countries to pursue the triple role (teaching, research and commercialization) model (Datta and Souleh, 2018)<sup>31</sup> as it is in the case of Algeria.

Therefore, this study will examine the situation of the university-industry linkages conceptualized under the Triple Helix Model-THM in Biskra's University from the perspective of research community and will verify if the University of Biskra has strong and official linkages with the industry and if the research community is aware of the importance of the collaboration with the social and economical sector.

## **II- Methods and Materials:**

This study has diagnosed the linkages between the university and its social and economic sector from the perspective of research community (professors and PhD student's) of Biskra's university in Algeria in qualitative and quantitative approach. The study has used a survey distributed to a sample of 10% of the research community on June 2019 and these first results were studied at November 2019.

The research community (professors and PhD student's) of Biskra's university represents a total of 4058 element, among them 1497 professors and 2561 PhD student. The table n (01) shows the number of professor and PhD students in each faculty of the university.

We addressed our survey to a sample of 10% of the whole community (4058) which means 406 elements, we have sent the survey to the sample via email randomly and we have received about 138 answers which mean a percentage of 34% response from the sample.

The survey is divided to three parts: First part is the identification of the sample, the second part contains five questions about: The existence of interactions between Biskra's university with the social and economical sector; the language used in the collaboration; The evaluation of the easiness of establishing a link with the social and economical sector; the number of collaboration per year and finally, the types of collaboration. The last part was about suggestions from the community of research to establish and maintain the linkages between the university and its environment.

We have used questions with multiple answers in the survey and the percentage of the answers later to analyse the data we have collected from the survey.

### III- Results and discussion :

#### III-1-Data analysis and discussion:

We have received about 138 answers from a sample of 10% of all university departments with a total response of 34%; where the biggest percentage of answers comes from the Faculty of Exact Sciences and Sciences of Nature and Life more than 33%, then from the Faculty of science and technology with more than 32%, because they have the biggest number of professors in the university; then it comes the Faculty of Economic and Commercial Sciences and Management Sciences with more than 16% of the answers as it shown in the table n(02).

Through analyzing the survey, the professors represent the biggest percentage of the study (58%) more than PhD students (21%) which represent their interest in the study. We have noticed the interest also of the professors who are heads of research teams (around 15%) and laboratories in this study (almost 07%) as it shown in the table n (03). This interest comes from the collaboration in research projects as: National research program (PNR: Programme National de recherche) where the research teams need a social or an economic partner where they address a problem in its enterprise. Also, the collaboration in university research and training projects (PRFU: Projet de Recherche-Formation Universitaire) where they tend to train PhD students on research and helping them to go forward in their PhD research by addressing some issues in the social and economic sector. Without underestimating the international research projects like: Tassili, Horizon2020, COST (European Cooperation in Science and Technology)...etc that have an added value to the university and the enterprises involved.

The table n(04) shows that 55% of the sample has no interactions with the social and economical sector but they want develop some, 26% have non-official interactions with the social and economical sector, 12% have official interactions, and around 6% of the community doesn't want any interactions with the social and economical sector. These results can be explained by the lack of official linkages between the university and the industry like: Conventions, consulting, projects of local and national development, and most of the linkages are established based on personal level. The results show also that the community also is not really aware of the importance of the collaboration between the university and its social and economic environment.

Based on these results, the hypothesis: *H<sub>1</sub>: Based on the Triple Helix Model-THM, the University of Biskra has strong and official linkages with the industry*, is verified and not accepted because university of Biskra has a few official linkages and they are weak due to the lack of common activities and collaboration with the social and economical sector. Also, the University of Biskra is a centralized public institution that still not independent on the managerial and the financial level which affects its ability and its motivation to initiate linkages with the industry, these results lead us to the "static", the first mode of Triple Helix Model where the state still control the activities between university and industry.

The table n(05) shows that 72% of the sample uses French as a language of interactions with the social and economical sector, 66% of the sample uses Arabic as a language of interactions, and 31% uses English in interactions. The community has chosen more than one answer in matter of using languages in interactions, we noticed also that using French and Arabic is the highest percentage which due to the colonized history and the culture of Algeria.

The table n(06) shows that almost 49% of the sample has evaluated the establishing of links with the social and economical sector as hard task, around 30% of the sample evaluated it as an easy task but 18% have evaluated as a very hard task, and 04% found it as a very easy task. Most of the community admits that establishing linkages with the industry is not an easy task due to the lack of the official framework from the university to initiate and formalize the collaboration.

Through the study, we found that more than 43% of the sample has no collaboration with the social and economical sector during the year, 32% has one time collaboration per year, 12% has collaboration with the social and economical sector more than three time per year, 09% has twice collaboration per year, 04% of the sample has three time collaboration as it shown in the table

n(07). The one time collaboration per year can be explained by the supervising of students and establishing PRFU projects where professors create links with the industry to help their Master and PhD students this collaboration can go to twice per year and it can include also the scientific visits that needed for applied teaching and activities. The collaboration that goes to three times per year or beyond that is focused mostly on personal consulting activities and national or international research projects.

The table n(08) shows the collaborations types between the community of research at Biskra's university and the social and economical sector, where we found that the 54% community of research at Biskra's university defined the collaboration as a student training mostly, 40% as collaboration in research, 26% as a consulting services, 07% in doing reports, 04% in patents collaborating, and fewer percentages in other collaborations types like: (seminars, conferences, sponsoring, doing projects and training). What is noticeable also that 02% of the sample does not see in collaboration between the two parties any importance which is huge deal in the higher education sector. The community has chosen more than one answer in matter of collaborations types.

The results show that the community of research sees the collaboration between university and industry mostly in the students training to finalize their Master or PhD thesis which represent a benefit for the university in most of the time and cannot be the same to the industry especially with the reduced number of enterprises and the increased number of students, this unbalanced linkages cannot be a matter of official collaboration due to the lack of benefits to the industry. Regarding to the consulting services, establishing reports, and collaborating patents are still a personal activities for professors due to absence of the official framework from the university which normally should be the heart of the collaboration between the university and the industry due to their benefits for both sectors in the transfer of technology, creating spin-offs, start-ups, employability, innovation and patents commercialization...etc.

Based on the results of the table 07 and 08, the hypothesis:  $H_2$ : *The research community in Biskra's university is aware of the importance of the collaboration with the social and economical sector as both entities are essential elements in the Triple Helix Model-THM*, is verified and not accepted.

### III-2-Results of the study:

Based on the data analysis and the discussion we found the following results:

- The linkages between the University of Biskra and the industry is conceptualized under the "static", the first mode of Triple Helix Model where the state still control the activities between university and industry.
- The Faculty of Exact Sciences and Sciences of Nature and Life more and the Faculty of science and technology were the faculties the most interested in the study;
- The professors represent the biggest percentage of the study more than the PhD students;
- The majority of the study sample has no interactions with the social and economical sector but they want develop some;
- The research community uses mostly French as a language of interactions with the social and economical sector,
- The sample of the study has evaluated the establishing of linkages with the social and economical sector as hard task;
- The majority of research community in Biskra's university has no collaboration with the social and economical sector during the year;
- The research community in Biskra's university defines collaboration with the industry in student's training mostly;
- The research community in Biskra's university is not aware of the importance of the collaboration with the social and economical sector as both entities are essential elements in the Triple Helix Model-THM.

#### **IV- Conclusion:**

This study has highlighted the situation of the university-industry linkages in Biskra's University from the perspective of research community, and through the data analysis and discussion, the two hypotheses: *H<sub>1</sub>: University of Biskra has strong and official linkages with the industry and H<sub>2</sub>: The research community in Biskra's university is aware of the importance of the collaboration with the social and economical sector;* were tested and not accepted which means there is no enough official links between the university of Biskra and its social and economical environment due to the lack of awareness of the importance of this kind of linkages. It appears as though scientists and administrators do not understand or appreciate industry culture/constraints, and industry does not understand or appreciate university culture/constraints. (Siegel et al., 2004, p132)<sup>32</sup>.

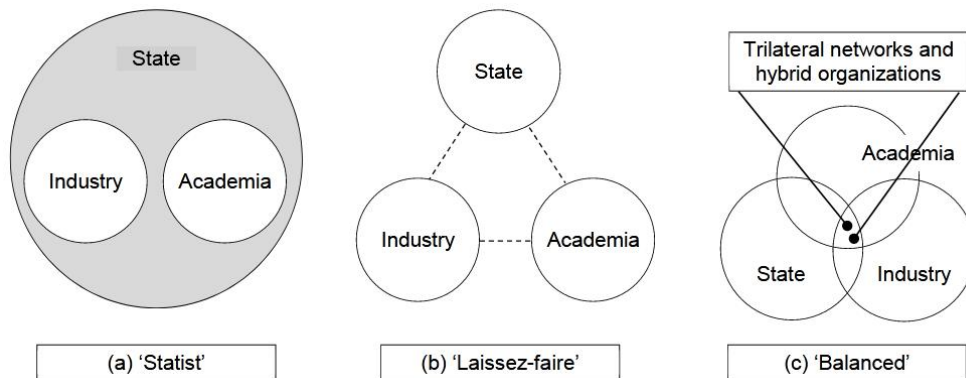
Therefore, this study gives some suggestions and recommendations about building, maintaining and improving official interactions with the social and economical sector as follows:

- Raising awareness among the research community about the importance of the linkages university-Industry;
- Understanding the new laws of promoting R&D and the linkages university- industry;
- Establishing a real conventions and collaborations with social and economical sector with a plan of actions and tasks...etc;
- Offering the industry products of quality as: professional training, education, expertise, round tables meeting of collaboration, workshops, seminars, etc;
- Giving the administrative positions to people who already have the experience with industry;
- Establishing research theses, projects and conferences with industry based on industry real issues in the field that get evaluated after action in a strict period of time and using a serious funding.
- Evaluating of the collaboration conventions by defining the responsible of applying the agreements and evaluating the work done in each phase.
- Investing in the liaison institutions between university and its social and economical environment as: (Liaison office between enterprises and university <sup>33</sup> , Incubator, Technology transfer office,... etc.

Beside the suggestions and recommendations that we have already given in this study, we insist that professors must do initiatives to establish linkages with the social and economical sector of the university to benefit of these linkages in many domains as: Funding project, research issues, R&D, sponsoring scientific events, patents,...etc. Also, it is up to university to prove the quality of its products: Graduates, consulting, expertise, patents, professional education and training... etc, to win the trust of industry and sell its products, which happen to be always in the scope of responsibility of the professors and the university managers.

This study is limited only to university of Biskra but it can be applied on all Algerian universities and for future studies the survey of this study can be supported by other data based on the quality insurance basics in higher education institutions in matter of its linkages with the social and economic sector.



**- Appendices:****Figure (1): Triple Helix configurations**

The source: Etzkowitz and Leydesdorff (2000)

**Table (01): The community of research and the sample of the study of the Biskra's University- Algeria**

<i>Faculties of University of Biskra- Algeria</i>	<i>Number of professors</i>	<i>Number of PhD students*</i>
Institute of Science & Technology of Physical & Sports Activities	30	38
Faculty of Humanities & Social Sciences	165	246
Faculty of Economic & Commercial Sciences & Management Sciences	196	290
Faculty of Law & Political Science	125	230
Faculty of Letters & Languages	202	285
Faculty of Exact Sciences & Sciences of Nature & Life	365	609
Faculty of science & technology	414	863
<b>Total</b>	<b>1497</b>	<b>2561</b>
<b>Total of Professors and PhD students of the University</b>	<b>4058</b>	

**Source:** Statistics established by the author based on the Biskra's university faculties website and the University PhD office<sup>34</sup>, <http://univ-biskra.dz/index.php/fr/>, accessed 20 November 2019<sup>35</sup>.

**Table (02): The answers of Biskra's University Faculties**

<i>Faculties of University of Biskra- Algeria</i>	<i>Number of answers</i>	<i>% of sample</i>
Institute of Science and Technology of Physical and Sports Activities	03	02.17
Faculty of Humanities and Social Sciences	09	6.52
Faculty of Economic and Commercial Sciences and Management Sciences	23	16.67
Faculty of Law and Political Science	04	02.90
Faculty of Letters and Languages	08	05.80
Faculty of Exact Sciences and Sciences of Nature and Life	46	33.33
Faculty of science and technology	45	32.61
<b>Total</b>	<b>138</b>	<b>100</b>

**Source:** Statistics established by the author based on the survey (November 2019).

\* PhD students of two systems: Doctorat de sciences (Old system) + Doctorat, Licence, Master, Doctorat-LMD (New system).

**Table (03): Identification of the study sample**

<i>Identification</i>	<i>Number of answers</i>	<i>% of the sample (138 answers)</i>
Head of laboratory	09	<b>06.52</b>
Head of team of research	20	<b>14.49</b>
Professors (professors and researcher)	80	<b>57.97</b>
PhD students	29	<b>21.01</b>
<b>Total</b>	<b>138</b>	<b>100</b>

**Source:** Statistics established by the author based on the survey (November 2019).

**Table (04): The existence of interactions between Biskra's university and the social and economical sector**

<i>Item</i>	<i>N of answers</i>	<i>% of the sample</i>
Yes, I have official links	17	12.32
Yes, I have non-official links	37	26.81
No, no links but I want develop some	76	55.07
No, I don't need this kind of links	08	05.8
<b>Total</b>	<b>138</b>	<b>100</b>

**Source:** Statistics established by the author based on the survey (November 2019).

**Table (05): The Language used in collaboration by the research community of Biskra's university**

<i>Language of collaboration (the sample can choose more than one answer)</i>	<i>N of answers</i>	<i>% of the sample (138 answers)</i>
Arabic	91	65.94
French	100	72.46
English	43	31.16
<b>Total</b>	<b>243</b>	<b>/</b>

**Source:** Statistics established by the author based on the survey (November 2019).

**Table (06): The evaluation of the easiness of establishing a link with the social and economical sector**

<i>Evaluation of the easiness of establishing a link with the social and economical sector</i>	<i>N of answers</i>	<i>% of the sample</i>
Very hard	25	18.12
Hard	67	48.55
Easy	41	29.71
Very easy	05	03.62
<b>Total</b>	<b>138</b>	<b>100</b>

**Source:** Statistics established by the author based on the survey (November 2019).

**Table (07): Number of collaboration between Biskra's university and the social and economical sector**

<i>Number of collaborations per year</i>	<i>N of answers</i>	<i>% of the sample</i>
None	60	43.48
1 time per year	44	31.88
2 times per year	12	08.70
3 times per year	06	04.35
More than 3 times per year	16	11.59
<b>Total</b>	<b>138</b>	<b>100</b>

**Source:** Statistics established by the author based on the survey (November 2019).

**Table (08): Types of collaborations between Biskra's university and the social and economical sector**

<i>Types of collaborations</i>	<i>N of answers</i>	<i>% of the sample</i>
Students training	75	<b>54.35</b>
Patents	06	04.35
Research	55	<b>39.86</b>
Reports	10	07.25
Consulting	36	<b>26.09</b>
Training	02	01.45
Seminar	01	0.72
Sponsoring	01	0.72
Project	01	0.72
<b>Nothing</b>	<b>03</b>	<b>02.17</b>
<b>Total</b>	<b>190</b>	<b>/</b>

**Source:** Statistics established by the author based on the survey (November 2019).

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**How to cite this article by the APA method:**

Samah SOULEH (2020), **University-Industry Linkages: an Analysis from the Research Community's Perspective at Biskra University**, *El-Bahith Review*, Volume 20 (Number 01), Algeria: Kasdi Marbah University Ouargla, pp. 131-143.