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**Investing the higher education system and scientific
research in the human element to encourage innovation
(Case study of the Faculty of Economic Sciences in Tlemcen)**

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الملخص:

يهدف هذا البحث إلى دراسة مستوى أداء نظام التعليم العالي والبحث العلمي في استثمار العنصر البشري من أجل تشجيع ودعم عملية الإبداع وذلك من خلال دراسة قطاع التعليم العالي في الجزائر (كلية الاقتصاد العلوم، جامعة أبو بكر بلقايد تلمسان). درسنا ملفات عدد الأساتذة وطلاب الدكتوراه والعاملين في كلية العلوم الاقتصادية وعلوم التجارية وعلوم التسيير للفترة 2006-2017. وقد أظهرت النتائج و البيانات أن عدد طلاب الدكتوراه والأساتذة وموظفي كلية العلوم الاقتصادية يتزايد كل عام. و تم دراسة حسب نوع الجنس بنسبة لعدد الأساتذة وطلاب الدكتوراه وعدد الموظفين في كلية العلوم الاقتصادية والعلوم التجارية وعلوم التسيير (نساء و رجال) ، حيث وجدنا ارتفاع عدد النساء مقارنة بالسنوات السابقة، و تم استخدام برنامج Excel في ترجمة البيانات.

الكلمات الدالة: إبداع ، استثمار في رأس المال البشري ، تعليم العالي والبحث العلمي، كلية العلوم الاقتصادية، تلمسان. تدريب.

Résumé:

This research aims to study the level of performance of the higher education system and scientific research in the investment of the human element in order to encourage and support the process of innovation and this through the study of the higher education sector in Algeria (Faculty of Economic Sciences, University of Abu Baker Belkaid Tlemcen)

We studied the files of the number of professors and doctoral students and employees of the Faculty of Economic Sciences, Commercial Sciences and Management Sciences for the period 2006-2017. The results and data showed that the number of doctoral students, professors and staff of the Faculty of Economic Sciences is increasing each year.

The number of professors and PhD students and the number of employees at the Faculty of Economic Sciences, Commercial Sciences and Management Sciences (women and men) was examined by gender. We found that the number of women increased compared to previous years. Excel was used to interpret the data.

Key Words: Investment in Human Capital, Innovation, Higher Education and Scientific Research, Faculty of Economic Sciences, Tlemcen.Training.

Introduction

the world is witnessing vast transformations and a great knowledge, scientific and technical revolution. This has led to the emergence of new economic trends, has invaded information and communication technology and informatics of most sectors of the economy and knowledge is an economic revolution. Knowledge from ancient times has played a major role in creating wealth and improving the quality of life, But they did not find the attention they see today. The classics, for example, did not give them the necessary attention or even technological changes. Kline and Resenberg asked: "It is surprising when you find that the classics did not seem interested in technological changes." ¹

Ricardo only studied the short-term impact of technology and did not test long-term effects, and gave it a negative role in economic growth. The classics considered wealth creation to arise from three fundamental factors: labor, capital and land, and knowledge and technology did not consider it productive.

There is also the theory that turned the scales Joseph Schumpeter when he talked about innovation (new knowledge), which will bring monopoly monopolistic profit. Schumpeter presented his comprehensive theory of creativity in the first half of the last century, which continues to be an important factor in the interpretation of innovation and its role in economic development, increasing productivity and improving per capita income. He spoke mainly about technological innovations.

The world is moving toward a knowledge-based economy that relies on information and knowledge through interest in education, training, development, spending or spending. The basis of the success of the knowledge economy is to invest in ideas in order to obtain the value added knowledge, Which are of great importance in increasing productivity, increasing employment opportunities, focusing on information and technologies and thus obtaining development.

Investment in human capital is one of the modern management strategies that focus on increasing the productivity of the employee through training and education and developing his skills and creativity, as the link between the level of human resources and the level of knowledge and science. This reflects the progress of R & D activities and in keeping with modern technologies and technologies. To adapt to the changes of the ocean, and there must be effective organization and management of human resources in order to achieve innovation

The objective of this study is to show the level of performance of the higher education system and scientific research in its investment of the human element in

order to encourage and support the process of innovation and this is through the study of the higher education sector in Algeria (Faculty of Economic Sciences, University of Abou baker belkaidTlemcen.) The following problem is raised:

Do you the system of higher education and scientific research in Algeria investing in the human element?

There are two hypotheses to study:

H1: The number of professors and doctoral students and number of employees in the Faculty of Economic Sciences, Business Sciences and Management Sciences is increasing each year.

H2: The number of women PhD students and professors and number of employees in the Faculty of Economic Sciences, Business Sciences and Management Sciences increases each year.

I. The theoretical framework

I.1 Definition of human capital

Adam smith (1790-1723) was the first to speak about the importance of spending on education in his book *The Wealth of Nations* in 1776, which included some of his own ideas about the economic importance of education and the need to allocate certain expenses for educational purposes.²

Theodor&Schultz defined human capital as: "the sum of human energies that can be used to exploit all economic resources"³

Harrison and Myers define human capital : "all human forces capable of holding administrative and technical functions".⁴

The United Nations Development Program (UNDP), Human capital as "all that increases the productivity of workers and employees through the cognitive and technical skills they acquire through science and experience"⁵.

It is the knowledge, skills, potentials, abilities, qualities and characteristics of individuals that are relevant to and related to economic activity. Human capital focuses not only on individuals' knowledge, skills, abilities and characteristics but rather on individuals using what they learn and use. A product related to economic activity. Economic activity is intended here as an activity that does not achieve wealth or income directly or indirectly. This activity is achieved mainly in organizations and through paid individuals, and as such it extends to any non-market activity such as some Active community and voluntary⁶

Human capital is an intangible asset within the organization's capacity. This asset supports and enhances productivity, innovation, innovation and better operation. It varies from one organization to another. It may be abundant in an organization and may be weakened in another organization.⁷

I.2. Definition of investment in human capital

- Investing in human capital is "spending on developing human abilities, skills and talents so that they can increase productivity"⁸

-It is a set of concepts, knowledge, information, skills, experiences, attitudes, behaviors, ideals and values attained by human through formal and informal education systems, which contribute to improving productivity and increasing benefits and benefits⁹

The reasons for investment in human capital are:

The reasons why organizations are concerned with human resources and regard them as an essential source of competitive capabilities and they are the most important assets in the organization which prompted them to invest in them are due to:

- Special scientific and technical developments: Information and communication technologies, which require assimilation in their application and this through the efficiency of human resources.

- Accelerating innovation and the modernization of products and services and the use of new technologies, increasing attention to the development of innovative and creative skills for employees and opportunities for them to contribute their ideas and innovations to develop the competitiveness of organizations.

- Increasing competition between existing producers and other new producers, expanding markets and increasing demand for different, new and distinct qualities to compete with competitors and gain competitive advantage.

- The phenomenon of globalization, openness to world markets and the liberalization of international trade through the removal of tariff and non-tariff barriers have also contributed to the stimulation of investment in human capital, given the increasing need for a new quality of human resources that understand different cultures and accommodate new variables.

I.3. Importance and dimensions of investment in human capital¹⁰

" A. MARSHALL", he stressed the importance of investment in human capital as a national investment. In his opinion, the highest type of capital is the capital that invests in human beings. Human resources transfer resources from mere quantities to various technological energies that achieve progress and development.

HARBISON and MYERS have divided into four levels, depending on the impact of education and human development in economic growth:

1- **Under developed countries** :These countries suffer from a lack of awareness of education and the limited potential of schools and the spread of school dropout phenomenon,(40% of the 6-12 age group is in primary school, 3% of the 12-18 age group is in secondary school). Most of the countries in this group have no universities or higher institutes.

2- **Partially developed countries** :These countries are characterized by rapid development in terms of quantity at the expense of the quality of education, and suffer from the country's high dropout rate and the shortage of teachers, as universities are interested in the theoretical aspect of education.

3- **Semi – advanced countries** :Education is characterized by school dropout, which is less severe compared to the previous two categories, and secondary education is diverse and tends to the academic direction in order to prepare for university education, which is characterized in this country rise, where the universities suffer from overcrowding of students and lack of material resources and lack of teaching staff.

4- **Advanced countries** :Countries that achieved an advanced economic level especially in the field of industry and flourish in the movement of scientific discoveries and has a balance of qualified human and qualified manpower and trained and characterized by high level of university education and interest in scientific colleges as well as scientific research and invention.

The dimensions of investment in human capital are:

- **Cultural dimension**: It results in an increase in the percentage of intellectuals from human resources in the civilizational development of society and increases the adherence of the individual to his religious beliefs and cultural heritage and language and literature,

-**The economic dimension**: Through qualified and trained human resources, economic development programs are implemented that provide the needs of various goods and services. This is due to qualified and trained human resources, which works and produces added value that contributes to the revitalization of the economic cycle and the progress of the state.

-**The Social dimension:** Education develops the individual's intellectual abilities and balanced behavioral values make him more able to understand social problems and strengthen family ties, and has a tangible impact on the human feeling itself.

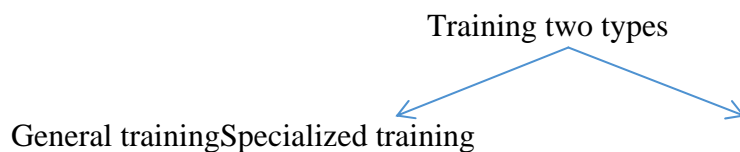
- **The Scientific dimension:** Education provides scientific cadres capable of research, innovation, invention and development, and the various cultural transitions and access to technical progress in various areas of life and continuous improvement in the means of living.

- **The security dimension:** The interest in education and training of the individual leads to a reduction in the unemployment rate and this is because of the high level of education and training and thus achieve the security stability of the community.

I.4. Theories of Investment in Human Capital:

1-Theory Schultz : This theory focused on education, which regarded education as a form of capital as a productive service of economic , View Schultz That some researchers believe that the purpose of education is a cultural purpose not economic . Schultz considers that Education achieves cultural and economic goals by providing Labor force expertise ,Scientific and practical skills and increasing their abilities to improve production as quality and quality¹¹.

2-Theory BECKER : He was interested in studying the different forms of human investment from education, migration and health, Consider that training is an investment in the individual and his intelligence .**BECKER** will differentiate between two types of training are two : ¹²



1-General training: increases the marginal productivity of the individual in the organization, provides training, The organization resorts to this type In case of non-bearing Cost of training, The trainee individual shall bear the cost of the training by giving him a wage lower than the normal rate during the training period. The Organization achieves cost-effectiveness by providing this type of training. The marginal production per capita increases the remuneration paid to it by the Organization. In order for the Organization to maintain and attract trainees. That the cost of turnover Is not strongly linked to the general training cost, because the organization understands that the individual is a general trainee He can easily join any other organization. The cost of this type of training is borne by the individual So that the Organization would not incur a financial loss.

2-Specialized training: Increases the marginal productivity of the individual in the organization, Which gives him more training than marginal productivity if he works in any other organization. The resources spent in the Organization for the new worker

The cost of identifying the potential of a new individual at work by testing and testing the probability of success or failure. It is included in the cost of specialized training

This must be done optimally for the workforce. The value of the trainee individual increases in the organization and gives him a high salary.

II .Applied framework for the study of University Abou

BakerBelkaidTlemcen

II.1. The emergence of the University Abou Baker BelkaidTlemcen

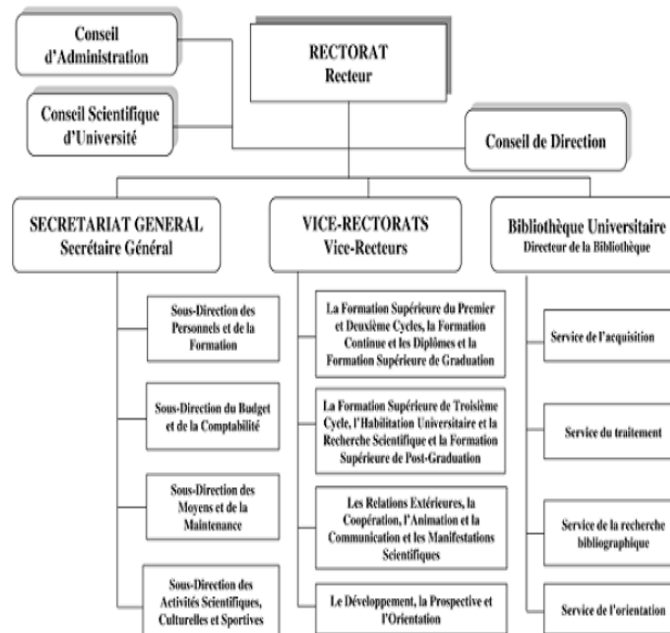
Created by Decree No. 89-138 of August 1 1989 as amended and supplemented by Executive Decree No. 95-205 of August 5 1995 and amended by Executive Decree No. 98-391 of December 2 1998 the University of BelkaïdAbouBekrTlemcen is the result of a long evolution.Higher education was first provided in a university center that included at the origin (1974-1980) the only core curriculum of Exact Sciences and Biology. This teaching has gradually expanded to new sectors, covering every year, a series of training courses and giving students the opportunity to pursue his entire graduation courses in Tlemcen. In addition to the establishment, often in difficult conditions of university in Tlemcen, the former University Centre can count to its credit the release of the first promotions in Social and Human Sciences and in language.

The establishment, in August 1984, the new university map and thus the creation of national institutes of higher education will first consequence of allowing in one hand, certain sectors of fact confined to mere departments to acquire the status of real institutions, on the other hand to new sectors to emerge.This stageis also characterized bythe creationof alevel 5 of education (University Applied Studies Degree: D.E.U.A) and the development of the first post-graduationinal most all sectors insured in Tlemcen, finally by the launch of the second post graduationfrom1991-1992.

It was at the end of fifteen years of gestation that appears the University of AbouBekrBelkaïd, a new entity, rich in this long period of maturation and open to new challenges.

The university has 8 faculties today. located on 5 university poles that are Imama pole Chetouane pole Kiffane pole, pole ring road also called the new pole and the pole Miloud barracks, to which adds Annex Maghnia.

II.2 The organizational structure of Tlemcen University¹³



the source: www.univ-tlemcen.dz

The University includes the Rectorate, eight faculties, an annex and common services:

The Rector is responsible for the general functioning of the University. He represents the university in all acts of civil life and exercises hierarchical authority over all the staff of the university. It shall ensure the application of the legislation in force in the field of education and schooling. He is the authorizing officer of the university's budget and is responsible for maintaining order and discipline. He shall be assisted in his duties by four Vice - Rectors and the Secretary - General.

The rectorate consists of four (4) vice-rectorships and is organized as follows:

-The Vice-Rectorate of the Higher Education of the First and Second Cycles, of the Continuous Formation and the Diplomas and of the Higher Graduate Training.

-The Vice-Rectorate of the Post-Graduate Higher Education, University Empowerment and Scientific Research and Higher Education.

-The Vice-Rectorate of External Relations, Cooperation, Animation and Communication and Scientific Manifestations.

-The Vice-Rectorate of Development, Foresight and Orientation.

II.3. Study of the Faculty of Economic and Commercial Sciences and Management Sciences

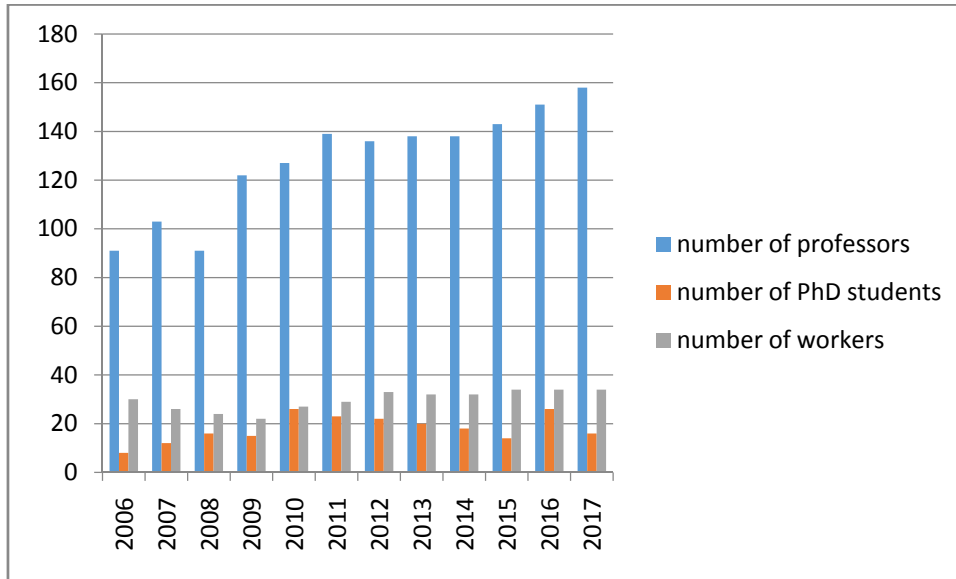
The Faculty of Economic and Commercial Sciences and Management Sciences is one of the most important faculties to be hosted by the University of Tlemcen according to Executive Decree No. 01-264 of 18/09/2001 and amended by Decree No. 84-209 on the Organization and Management of Algerian Universities. Economic and Commercial Sciences and Management Sciences was a former institute and then became a college in accordance with Decree No. 98-232 of 02/12/1998 which includes the organization of the Algerian University. The Faculty of Economic and Commercial Sciences and Management Sciences is not independent in terms of finance and administrative management of the university presidency.

Table01 :the number of PhD students and the number of workers and the number of professors for the year 2006-2017¹⁴

Year	number of professors	number of PhDstudents	number of workers
2006	91	8	30
2007	103	12	26
2008	91	16	24
2009	122	15	22
2010	127	26	27
2011	139	23	29
2012	136	22	33
2013	138	20	32
2014	138	18	32
2015	143	14	34
2016	151	26	34
2017	158	16	34

Source: Faculty of Economic Sciences, Commercial Sciences and Management Sciences

Figure(01):These results are translated into graphs



Source prepared by researchers

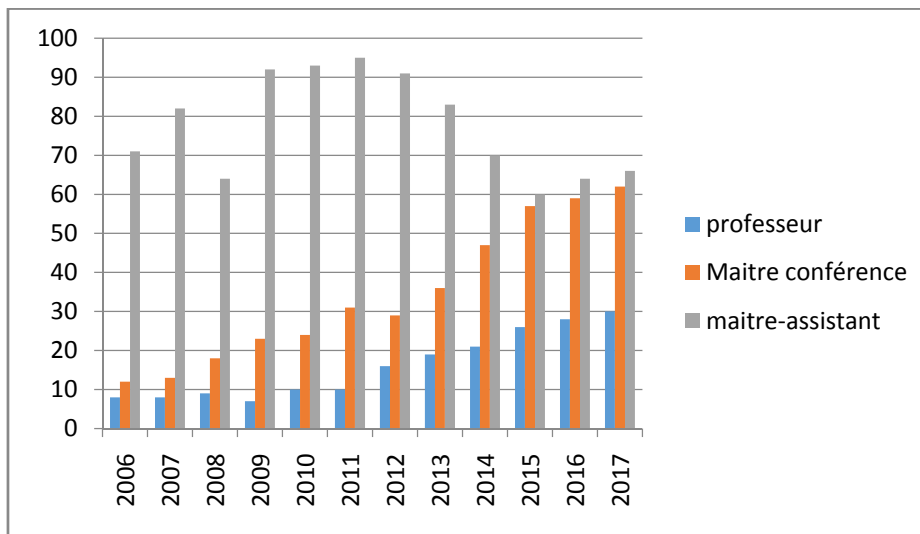
Remark :The graph shows that the number of teachers is high compared to the number of employees and the number of doctoral students in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences, The number of investments in the human element is increasing each year.

Table 01 : number of professors in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences for 2006-2017

year	professeur	Maitre conférence	maitre-assistant	total
2006	8	12	71	91
2007	8	13	82	103
2008	9	18	64	91
2009	7	23	92	122
2010	10	24	93	127
2011	10	31	95	139
2012	16	29	91	136
2013	19	36	83	138
2014	21	47	70	138
2015	26	57	60	143
2016	28	59	64	151
2017	30	62	66	158

Source: Faculty of Economic Sciences, Commercial Sciences and Management Sciences

Figure (02): the number of professors in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences for the year 2006/2017



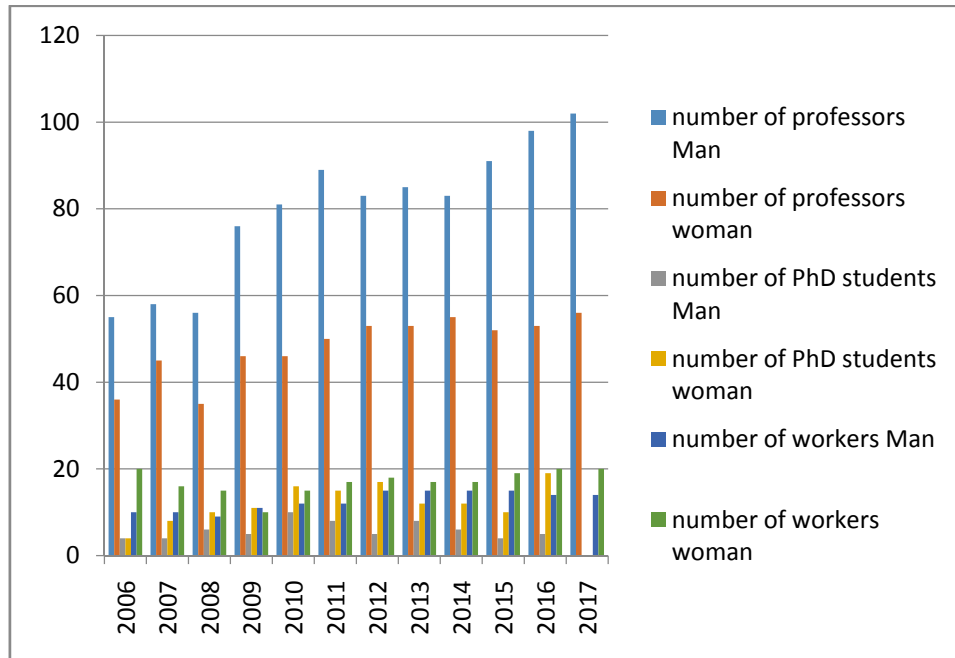
Source prepared by researchers

Table(03) :the number of professors and number of PhD students and the number of workers in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences by gender for the year 2006-2017

year	number of professors		number of PhDstudents		number of workers	
	Man	woman	Man	woman	Man	woman
2006	55	36	4	4	10	20
2007	58	45	4	8	10	16
2008	56	35	6	10	9	15
2009	76	46	5	11	11	10
2010	81	46	10	16	12	15
2011	89	50	8	15	12	17
2012	83	53	5	17	15	18
2013	85	53	8	12	15	17
2014	83	55	6	12	15	17
2015	91	52	4	10	15	19
2016	98	53	5	19	14	20
2017	102	56	/	/	14	20

Source: Faculty of Economic Sciences, Commercial Sciences and Management Sciences

Figure (03): number of professors(man/ woman) and number of PhD students and the number of workers in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences by gender for the year 2006/2017.



Source prepared by researchers

Conclusion

Many theoretical and applied studies have focused on the importance and importance of human capital, and that it is the basis for strong economic growth, the work of attracting, manufacturing and revitalizing intellectual capital and supporting its continuity and renewal because it is the wealth owned by institutions and it contributes to increasing and maximizing their market value.

examples of the impact of human investment in achieving progress and economic growth and social multiplicity, we find a country such as China, Japan and other countries of South-East Asia has achieved high rates of economic growth and has been able to overcome the barrier of underdevelopment and take the place of advanced among countries of the world based on the human resources has been rehabilitated And the development of the skills and capabilities, and the world is

witnessing a great scientific development, especially in information technology related to the use of computers and communications and electronics due to the high-level capabilities and skills of human .

Through this study we conclude that the performance of the Faculty of Economic Sciences "University of Abou Baker BelkaidTlemcen" is increasing every year and this through the increase in the number of doctoral students and professors and a shortage of workers, The University of Abou Baker BelkaidTlemcen has realize in recent years an increase in the number of women through PhD students and professors and number of employees in the Faculty of Economic Sciences, Business Sciences and Management Sciences compared to previous years.

- Appendix Tables and graphs

Table 01 :the number of PhD students and the number of workers and the number of professors for the year 2006-2017

Year	number of professors	number of PhDstudents	number of workers
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2007	103	12	26
2008	91	16	24
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2014	138	18	32
2015	143	14	34
2016	151	26	34
2017	158	16	34

Source: Faculty of Economic Sciences, Commercial Sciences and Management Sciences

Table02 : the number of professors in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences for 2006-2017.

Year	professeur	Maitre conférence	maitre- assistant	total
2006	8	12	71	91
2007	8	13	82	103
2008	9	18	64	91
2009	7	23	92	122
2010	10	24	93	127
2011	10	31	95	139
2012	16	29	91	136
2013	19	36	83	138
2014	21	47	70	138
2015	26	57	60	143
2016	28	59	64	151
2017	30	62	66	158

Source: Faculty of Economic Sciences, Commercial Sciences and Management Sciences

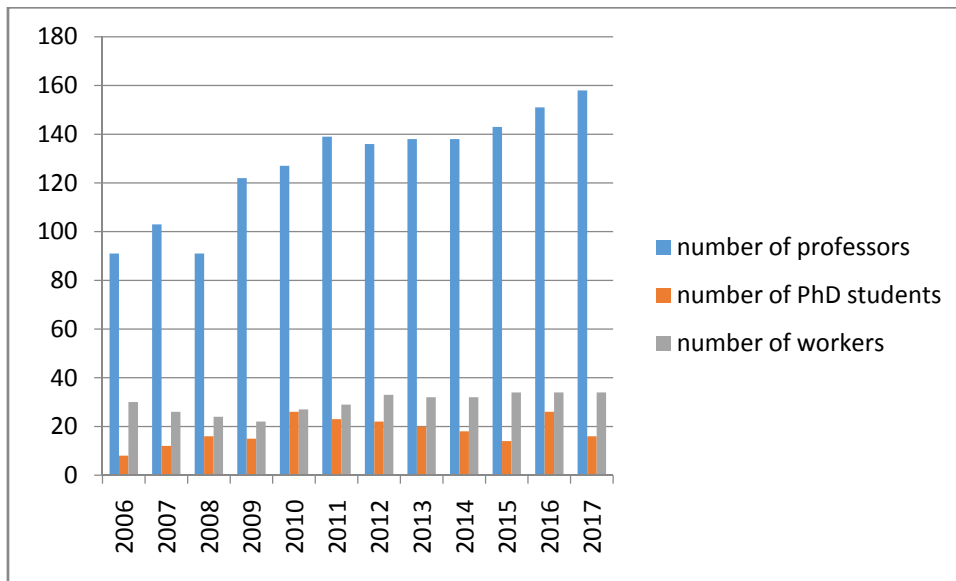
Table(03) :the number of professors in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences by gender for the year 2006-2017.

Year	number of professors		number of PhDstudents		number of workers	
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2006	55	36	4	4	10	20
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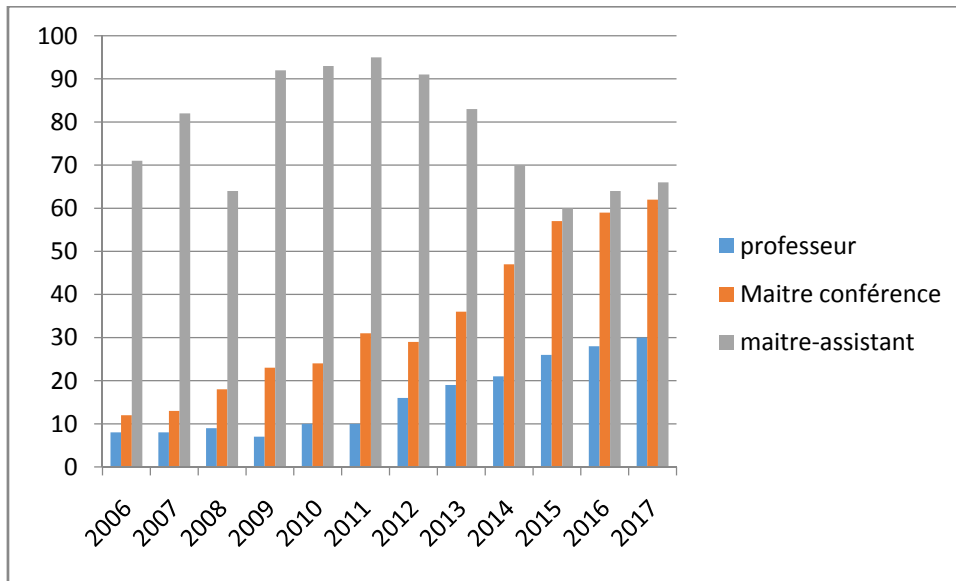
Source: Faculty of Economic Sciences, Commercial Sciences and Management Sciences

Figure(0 1):These results are translated into graphs



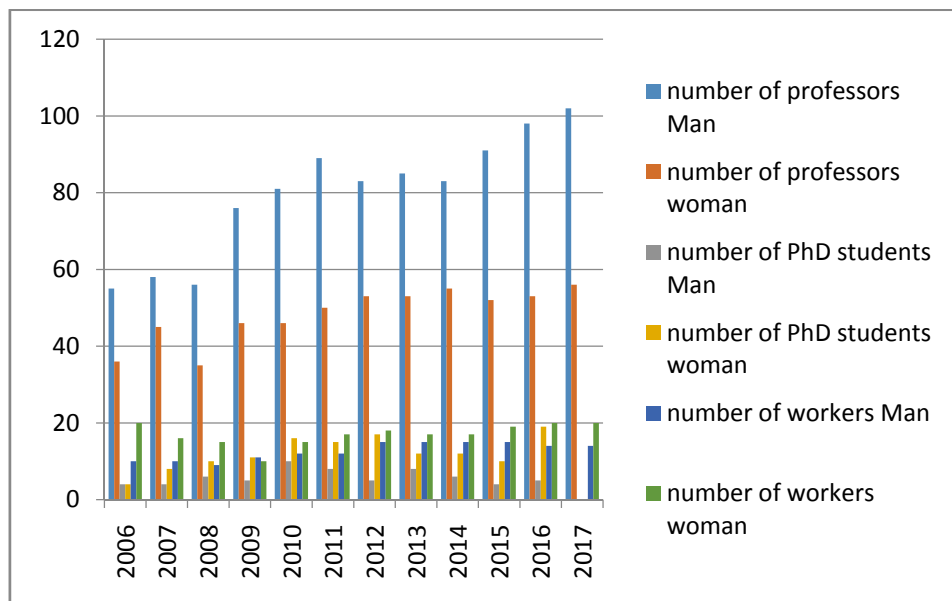
Source prepared by researchers

Figure (02): the number of professors in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences for the year 2006/2017



Source prepared by researchers

Figure (03): number of professors(man/ woman) and number of PhD students and the number of workers in the Faculty of Economic Sciences, Commercial Sciences and Management Sciences by gender for the year 2006/2017.



Source prepared by researchers

Reference:

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