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RESEARCH ARTICLE

LINKAGE FOR THE FORMATION OF HUMAN TALENT BETWEEN THE ACADEMY AND THE FURNITURE INDUSTRY OF THE STATE OF JALISCO

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ABSTRACT

The aim of the research sought to identify the link between the academy and the industry forniture for the training of specialized human resources by taking international and national theoretical references through models such as the Triple Helix (Etzkowitz, 2018) and public-private (Casalet, 2015). The main results of this research were 36% of the companies were linked with a public university and the rest to private universities either formally and informally where the social service was found to account for 17% and professional practices were represented around 12%, this meant that basic activities are still carried out in the Jalisco, Mexico furniture industry.

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INTRODUCTION

This paper is part of the results of a doctoral thesis project, where the main objective is to identify the training of specialized human resources through the link between the academy and furniture industry. For this purpose the relationships of formal and informal relationships are analyzed as a process of innovation that increasingly condition the actions of heterogeneous agents as they come in the area of science, technology and innovation policies, government programs and business stimulus. The main problem addressed in the research is the disarticulation of the institutional structure of both the educational supply and the demand of the sector for the training of specialized human resources in Jalisco. For this, the following questions arise: How do the processes of linkage between the academy and the furniture industry for the training of specialized human resources occur? Moreover, what has been the participation of heterogeneous actors in the training and strengthening of human resources? In this sense, the methodological design used in this research was based on an exploratory strategy, with the mixed method approach, a combination between qualitative and quantitative where 290 surveys were applied to furniture entrepreneurs in the state of Jalisco.

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This paper is divided into seven sections, taking into account the summary and the introduction, then describes some historical background of the link between the academy and the furniture industry, also addresses the modalities of linkage, the strategic axes and lines of action that guide the linkage in Mexico, as well as the results of the link between the academy and the furniture industry in the state of Jalisco, at the end, some conclusions are addressed which serve as a reflection of this work.

Background to the link between academy and industry: The link between the academic sectors (universities and institutions of higher education) and the productive sector date from the late eighteenth century, when both sectors both education, and production of the most advanced nations of the world at that time were somehow separated, highlighting that the former had a humanist tendency (human resources training) nuanced by the intervention of the church and the nobility and; the second, underpinned by an agricultural and artisanal economy, characterized by the grouping of workers in guilds (Rivera, 2006). In the US, the participation of the linkage of universities with private companies, mainly in high technology, began in the late 1970s and this trend has accelerated from then to the present in two areas: First, universities resisted during the 1980s to maintain federal research funds and the situation only worsened with the court to military research in the 1990s , after the collapse of the Soviet Union. Universities however needed to develop new sources of funding for research funds and the private sector

took the place of military research. Second, with Japan's challenging industry in the 1970s and with American industry in decline, many politicians demanded an increase in return on investment from most universities (Rivera and Cuéllar, 2013). A particularly successful case were the incubator projects between the companies and the Stanford University Technology Licensing office, which is currently producing between 150 and 180 discoveries per year, involving Professor Henry Etzkowitz founder and president of the International Association of the Triple Helix (Etzkowitz, 2008; 2018). Model that is taken as the basis for generating university-industry-government link actions detonated in developed countries. The following are the modalities of linking to detect those used in the process of linking between academy and furniture industry.

Linking modes: Linking modalities is the way in which the interaction between university-industry-government is carried out,in developed countries such as the United States, they perform different types of linking modalities, unlike traditional ones, since the 90's authors like Varela, (1999)takes up experiences from the United States and Canada to study the implications in Latin America, and other recent authors referred to in these modalities are Rickne, Laestadius, and Etzkowitz, (2013),where they describe that start-up modalities,*" spin off",* Technology Transfer Offices, Technology Parks, Clusters, etc. The following are defined by the linking modalities referred to in this paragraph:

- *Start ups;* the name of this type of linkage can be understood as "Interface" in Spanish that evokes a situation of separating the university and the company, that is, create a different center with the aim of offering research, consultancies, consultancies etc. Consequently, avoiding conflicts of interest of the academy or the company, within *the Start ups* plays an important role academics to offer research to companies through contracts, which facilitates business ties and demands.
- *Spin off:* This type of modality is usually called a kind of "Hybrid fixes" that serve to promote the transfer of knowledge, the Spin *off* can be owned by a university or a company in this regard if the university owned the *Spin off* can be an alternative to offering patent exploitation permits as a kind of licensing.
- Technology Transfer Offices; in order to explain this type of modality in English countries they call it *"Brokerage"* which means intermediation or intermediary authorities, that is, in the United States, these offices seek to encourage companies to seek academic advice with universities, companies to be in contact with some department or area of the university to raise the needs of companies, these transfer offices facilitate the flow of innovations from universities or research centers to the productive and social sector.
- Technology and scientific parks; This modality refers to places where high-tech companies are located, similar to a campus, with the aim of bringing together public and private institutions to develop research and development, that is, there is a continuous interaction between researchers and staff of companies, the rapid transfer of knowledge to companies, opportunities to create new companies even new forms of linkage.
- *Cluster;* This concept is coined by the intellectual author of Michael Porter in the 90's, where he defines *clusters* that are geographical concentrations of interconnected companies and institution (universities, research centers etc.), in a particular field. In other words, *Clusters* cover a wide variety of related industries and other entities important to face competition (Porter, 1998). For example, the cluster covers: the suppliers, specialized products, machinery, services and necessary infrastructure, and the cluster extends in the distribution channels to the end consumer that are the customers. Already a number of authors (Sölvell & Williams, 2013) have shown that the *cluster* in developed countries is a strategy of competitiveness and innovation and that it serves as a model for use in developing countries.

In Mexico, the above paragraphs are complemented by the *website* of the Ministry of Public Education in its linkage section (SEP, 2014), on some modalities or schemes to promote University-Enterprise collaboration projects, which, although it is not clear whether this is what the HEI must do to link up with the country's productive sector, then its content is expressed:

- Academic training of students through internships, residences and professional stays: It offers practical training of what is learned in class and allows the student to visualize their application in a real exercise within companies.
- Job insertion and monitoring of graduates: Based on studies of follow-ups of graduates, recommendations are obtained on the relevance of the educational offer and the situation of the labour market in the different social and economic sectors.
- Business incubators and promotion of an entrepreneurial culture
  It promotes the development of business skills to students, allowing them to develop their innovative business ideas so that they can then be channeled to business incubators.
- Exchange of staff to strengthen teaching: Temporary stays of teachers in companies and vice versa. Teachers participate in business projects that allow them to stay up-to-date on the needs of the social and productive sector, and learn new methodologies with the possibility of transmitting them in the classroom to their students.
- Research, technological development and innovation: Promote applied research and technological development to generate innovation and technology transfer processes within the private sector.
- Saw. Technology services: HEI offer solutions to problems and provide diverse supports through technologies suitable to support the technical requirements of companies.
- Advisory and consulting services: With the support of teaching staff, HEI have the capacity to offer specialized collaboration and guidance services aimed at meeting the needs of business organizations in terms of productivity and competitiveness.
- Training and continuing education courses: These are training and development programs for professionals to update their knowledge related to the exercise of their profession, whether they correspond to a prior diagnosis or an express request from a company linked to the HEI.
- Technology parks: Specific geographical areas where technology-based companies are housed that interact with universities and research centers.

- Mutual participation in collegiate and managerial bodies Assistance in collegiate and executive bodies in double track. That is, entrepreneurs or organizations that participate in councils of educational institutions; or researchers and administrators at an educational institution who participate in business committees.

The types of activities referred to by the Ministry of Public Education (SEP, 2014) are important, however, it is also appropriate to take into account the types of modalities referred to by Varela, (1999), Rickne, Laestadius, and Etzkowitz, (2013).To this end, the government of the Mexican republic was tasked with integrating in the past the National Development Plan (NDP) 2013-2018 and the Sectoral Education Plan (PSE) 2013-2018 to frame the actions that should be taken by the IES with the public, private and social sectors, below are the axes and lines of action.

Strategic axes and linking lines from the view of the PND and PSE (2013-2018)

The government of the Republic through the PND recognizes that the link between HEI and the productive sector is vitally important as one of the most indispensable strategies. For this purpose, the following lines of action as national linking policies are proposed within the objectives and strategies set out in the PND:

In addition, in the cross-cutting approach "Democratize productivity" to strengthen institutional linking capacities such as:

- Strengthen the institutional capacities of linking higher and upper middle-level levels with the productive sector, and encourage the ongoing review of the educational offer.
- Promote the establishment of institutional binding councils.
- Increase public investment and promote private investment in innovation and development activities in research centres and companies, particularly in the creation and expansion of high-tech companies.
- Establish a system for monitoring graduates of the upper and upper middle level, and carry out needs detection studies of the employer sectors.

In addition to what the NDP 2013-2018 mentions, the Sectoral Education Programme 2013-2018 includes some lines of action that appears from the plan with the approach of strengthening the relationship in the Higher Education Institution (HEI) with the productive and social sector in Mexico, are as follows:

The same Sectoral Education Programme (2013-2018), in addition to the cross-cutting lines with special emphasis "Democratize productivity" mention the following:

- Deepen the link between the education and productive sectors, and encourage the ongoing review of the educational offer.
- Flexibilize or eliminate administrative rules that unnecessarily hinder or impede school-enterprise linkages.
- Promote technology transfer, strengthening the linkage between higher education institutions, research centres and the productive sector.

With these strategic axes and lines of action referred to in the documents mentioned above, they serve as the basis for generating actions in universities and HEI to strengthen the linkage in the training of specialized human resources. Below are the results of surveys applied to furniture entrepreneurs.

Results of linkage between the academy and the furniture production sector for the training of specialized human resources: Human resources training is of vital importance, as it forms the basis for the realization of basic activities from professional practices, consultancies, consultancies, exchange of knowledge between companies with universities. To this end, 290 surveys were applied to the furniture companies, where they were analyzed from micro, small, medium and some large for the formation of HR. through the following table 3. These furniture companies represent an important sample of participation in the processes of linkage with the academy and companies, it can be observed that 42% are micro, 41% small, 12% medium and only 4% are large furniture companies, which group the furniture industrial sector, as shown in Table 3. It is important to mention that some of these furniture companies have been attended at different public or private universities in the State of Jalisco through various services that will be shown later. One of the important points to highlight is the level of importance of such linkage.

The level of importance of linkage between furniture companies with universities has shown a positive interest, that is, for companies it is vital to generate such links since in globalization and internationalization requires that these types of activities be done, for this, we observe in Table 4, the level of importance from the perspective of companies. For furniture companies it is important and very important to link with the different universities of the state of Jalisco, it can be seen that around 118 furniture companies responded that it is important the linkage where it represents 41% and 75 of them replied that it is very important to be in these bonding activities that represent 26%, moderately important represents 21% and without importance representing 13%. In this regard, it is noted that the number of companies are directly linked to the public and private universities of the State of Jalisco, although not the whole, but there is a progress of links. It is important to note that there is only one public university (UDG) and that it is divided into university centers and the other universities are private as shown below in The following Table 5. 36% of Jalisco's furniture companies are linked to the University of Guadalajara in the different university centers, of which 8% are linked with the University Center Art, Architecture and Design (CUAAD), 9% with the CIENEGA University Center, 6% with the University Center of Exact Sciences and Engineering (CUCEI) and 13% with the University Center of Economic Sciences (CUCEA). Likewise 9% are linked with the Jesuit University of Guadalajara (ITESO), only 1% is linked with the Metropolitan Area University of Technology (UTZMG), 2% with the Monterrey Institute of Technology (ITESM) Guadalajara campus, 4% with the Panamerican University, 8% are linked with the Autonomous University of Guadalajara (UAG) and the rest representing 6% are linked with different universities including links with the Atemajac Valley University (UNIVA), Institute of Technology

Table 1. PND Linking Action Lines 2013-2018

*Objective*3.5. Make scientific, technological and innovation development pillars for sustainable economic and social progress.	
	Strategy Lines of Action
Strategy 3.5.4.Contribute to the transfer and use of knowledge, linking higher education institutions and research centres with the public, social and private sectors.	Promote the link between higher education institutions and research centres with the public, social and private sectors. Develop specific programs to promote the linkage and creation of sustainable knowledge linking and transfer units. Promote the entrepreneurial development of higher education institutions and research centres, in order to promote technological innovation and self-employment among young people. Encourage, promote and simplify the registration of intellectual property between higher education institutions, research centres and the scientific community. Encourage the generation of high-tech small businesses. Drive patent registration to encourage innovation.

Source: Bautista, (2014); PND 2013-2018

Table 2. Strategies and lines of action linking PSE 2013-2018

Strategies	
Strategy 2.4 Promoting scientific and technological research and promoting the generation and dissemination of impact knowledge for the country's development	Strategy 2.5 Strengthening the relevance of work training, higher middle education and higher education to meet the country's requirements
Lines of action	
2.4.6 Support higher education institutions so that their internal organization promotes linkage with productive and social requirements.	2.5.5 Develop methodologies to measure the extent of the linkage of educational facilities with the productive sector.
2.4.8 Promote the linkage of researchers with bachelor's degrees and higher middle education programs.	2.5.6 Promote dual training and other schemes that allow partial accreditation of studies in companies.
2.4.9 Encouraging student participation in research activities	2.5.7 Promoting professional internships and internship programs or workspace stays.

Source: Bautista, (2014) based on PSE 2013-2018

Table 3. Company size

	Frequency	Percent
Micro	123	42%
Small	120	41%
Medium	34	12%
Large	13	4%
Total	290	100%

Source: Own elaboration

Table4. Level of importance in university-company linkage

Company size	Unimportant	Moderately important	Important	Very important	Total
Micro	8%	9%	19%	7%	42%
Small	3%	9%	15%	14%	41%
Medium	1%	2%	6%	3%	12%
Large	0%	1%	1%	2%	4%
Total	13%	20%	41%	26%	100%

Source: Own elaboration

Table 5. Linking furniture companies with universities

Company size	University of Guadalajara								ITESO		UTZMG		ITESM		UP		UAG		Otra ¿Cuál?	
	CUAAD		CUCIENEGA		CUCEI		CUCEA													
	Si	No	Si	No	Si	No	Si	No	Si	No	Si	No	Si	No	Si	No	Si	No	Si	No
Micro	3%	40%	2%	40%	1%	42%	4%	38%	3%	39%	1%	42%	1%	42%	1%	42%	3%	40%	3%	40%
Small	1%	40%	5%	37%	1%	40%	4%	38%	1%	40%	1%	41%	0%	41%	1%	40%	3%	39%	2%	40%
Medium	3%	9%	1%	10%	1%	10%	3%	9%	3%	8%	0%	12%	0%	12%	0%	12%	1%	10%	1%	10%
Large	1%	4%	1%	4%	2%	2%	2%	2%	1%	4%	0%	4%	1%	3%	2%	2%	1%	4%	0%	4%
Total	8%	92%	9%	91%	6%	94%	13%	87%	9%	91%	1%	99%	2%	98%	4%	96%	8%	92%	6%	94%

Source: Own elaboration

Table 6. Modalities of linkage with the universities of Jalisco

Company size	R&D of products or processes	Internship	Social service	Stays	Advisory and consulting services	Business incubators	Professional training	Joint Venture	Start ups	Spin offs	No	Total
Micro	5%	6%	4%	1%	5%	1%	3%	1%	0%	0%	16%	42%
Small	5%	7%	11%	4%	1%	0%	1%	0%	0%	0%	12%	41%
Medium	2%	3%	0%	0%	1%	1%	1%	1%	0%	0%	2%	12%
Large	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	2%	4%
Total	12%	18%	15%	5%	7%	2%	7%	2%	0%	0%	32%	100%

Table 7. Level of profession in linking activities

Company size	Primary	Midle school	High school	University	Master	Total
Micro	4%	8%	13%	15%	2%	42%
Small	3%	2%	12%	24%	0%	41%
Medium	0%	1%	3%	7%	1%	12%
Large	0%	0%	1%	2%	1%	4%
Total	8%	12%	29%	48%	4%	100%

Ocotlán, Veracruzana University (UNIVER), University of the Valley of Mexico (UNIVER), Universidad del Valle de México (UVM) and CETI Tonalá. The rest of the companies are not linked to any university. Furniture companies have a breakthrough in linking with the different universities of Jalisco, of course these links have been given formally and informally over the last 6 years. In this sense, it describes the actions of links that students and academics have in furniture companies. The students who joined the furniture companies were mainly social service representing 18%, for professional internships with 12%, in research and development with 12%, in advisory and consulting service 7%, professional training 6%, stays 5% and in the rest of the companies has not carried out these types of activities.

There are very few activities carried out in companies, although there are certain advances in linking such as social service, professional practices and some research and development activities. Sand obtained specific information on the level of profession in the linking activities for the training of human resources within the furniture companies, where it was detected broadly in the domain of some lower levels of profession shown through the following Table 7. The level of profession of people working in bonding activities in the furniture companies is of bachelor's degree or university that represents 48%, follows the level of profession in high school with 29%, in secondary or middle school represents 12%, and in what corresponds to primary 8% and with a master's degree only represents 4%.

Conclusion

It is concluded that the processes of linking between heterogeneous agents for human resource formation there is a vacuum or little treatment, i.e. they do not focus on strengthening the knowledge and skills required by the industry. In other words, little progress is made to generate links between universities with the Jalisco furniture industry in these activities. These collaborations between the company, university and the government referred by Etzkowitz (2008) from the 90's until this I am XXI, no company can easily succeed without the participation of these heterogeneous agents or as far as it is concerned (Casalet, 2015), the participation of public and private bodies whether national or international such activity is necessary to strengthen the training of specialized human resources , since this can lead to innovation activities and projects, so it is proposed that skills such as creativity, motivation and innovation be developed. With these three skills you can see effective solutions such as: technical solutions to the problems of technological processes, products or services. There are capacities of the universities of Jalisco where they have developed in the last 2 years mainly their physical and intellectual infrastructure, although the latter has been the least advanced, as shown in Chart 3, but they have the best classrooms in the country, very equipped, with state-of-the-art technology, with the use of Tics and other advances such as the creation of new careers aimed at the productive sector of furniture to meet the current demand , although the part of the reconciliation between business demand and the institutions' supply remains weak, that is, that win-win reconciliation is not yet built. Some of the universities of Jalisco have eliminated professional internships and replaced them with "projects of professional application", in the aim of having students implement their acquired knowledge in the university to the productive sector accompanied by professors as a guide. Others focus on "transforming lives" preparing new leaders, young people with a vision of the human spirit. For the training of specialized human resources in the furniture industry of the state of Jalisco, is the lack of participation in conjunction with universities, that is, most universities do not focus on training specialists in furniture, most of the people specialized in furniture, have been formed on the experience of the years that have been dedicated to working in the sector , although the university has been concerned with offering various training alternatives (diplomas, courses, workshops, etc.). These training alternatives have benefited very few furniture entrepreneurs over the past 3 years. This means that there is the will of some entrepreneurs to train intellectually, on the other hand, most of them do not have sufficient economic resources and the lack of interest in updating them for the renewal of the innovation structure of their businesses.

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