

# UNIVERSITY – SOCIETY LINK: CIVIL ENGINEERING CAREER OF THE CATHOLIC UNIVERSITY OF SANTIAGO DE GUAYAQUIL

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**Abstract** - The changes that occur daily in society, in technology, economy and culture, as well as in its administrative regulations, make its needs evolve continuously. Since university is a component of society, it must update its generation and dissemination of knowledge in light of these changes. The article stresses that the university must link with the government and society in general and manage their needs to generate and disseminate knowledge, from the current mode of production. As part of the research, the fundamental elements that must be incorporated into a management model for the link with society in the Civil Engineering career at the Catholic University of Santiago de Guayaquil are proposed. The interactions between its components are based on the definition of legal frameworks and economic subsidies (on the part of the government), new needs (on the part of society) and on the part of the university in the adjustment of its knowledge production, towards these needs. It is concluded that the application of the linking model will lead to distinguish activities and processes that improve the generation of knowledge and its application for solving problems of the society.

**Key Words:** Link, University, interaction, society, knowledge.

## 1. INTRODUCTION

Today society is facing continuous changes in all its sectors. Trade, industry, business and the common citizen are affected daily by a marked evolution in their different processes. These changes are firstly driven by the advancement of technology, which brings the most up-to-date knowledge at the global level to society in real time, and secondly, by the State's participation in the continuous innovation of legal frameworks and as an economic - financial driver in social processes.

The modes of production of knowledge have also evolved from a homogeneous disciplinary to a heterogeneous transdisciplinary during the last decades. The current situation of society has reached a new, interdisciplinary way, in which the teacher becomes an intermediary of knowledge, and beyond the master class, provides students with the guide to acquire knowledge with technological methods available.

The university, from its function as generator and diffuser of knowledge, cannot remain unaffected by these changes. It must understand these changes and update the production and dissemination of his knowledge in accordance with the changing needs and requirements of society. Being the State, as an administrative and regulatory entity, one more actor who participates in these changes, both from its position as a user, and from its role as receiver and observer of these changes in the society to which it directs, is then the task of University to couple its mission also to the requirements of the State.

This coupling must occur through a linking process, but this is not achieved spontaneously, it requires some instrument that facilitates the interaction and is accepted by both parties. The article presents the foundations of a model that guides the incorporation of real problems of the society in the formative processes of the university careers, in particular the Civil Engineering career, with the objective of improving the university's link with society.

### 1.1 Method

With the purpose of identifying the main points of contact between university and society, and as part of the research, a preliminary diagnosis was made, with the application of empirical methods such as documentary analysis, interviews with entrepreneurs and professors and authorities of the Career of Civil Engineering of the UCSG, institution object of study. The exploratory studies carried out helped to determine possible relations between the actors of the system.

As a result of the study carried out regarding university-society link, in the particular case of the UCSG, the following problematic situation was identified:

- Insufficient knowledge, skills and integrated values to assume the link with the environment as a sequenced mode of action applicable to the institutional system.
- It is not always integral the vision of the strategic needs of the institutional system, and the vital mechanisms of management of knowledge of the environment for covering them are not known.
- The education process lacks precision in the design of projects and programs specifically supported in actions aimed at linking with the environment.

- There are deficiencies in the way in which the management of the link of the Civil Engineering career with the community is carried out, which makes it difficult to guide the solution of the real problems of society.
- Lack of strategic, operational planning for the development and evaluation of linkage programs and projects.
- Information management and use of information and communication technologies in the development of social projects are below the real possibilities and needs of the territory

For the theoretical support of the bases of the model, theoretical methods were used as the historical - logical method when observing the evolution of the performance of the components and the basis of their link, and the analytical - synthetic method to consider the components of the interaction between university and society and propose their possible synthesis in a single model. The information obtained by both methods was then analyzed from a systemic and integrative approach, which allowed suggesting the bases, modeling the link with the social environment and establishing the relationship between the components of the model.

## 2. THE UNIVERSITY – SOCIETY LINK

The university-society link is currently one of the most sensitive factors in assessing and appreciating the relevance of the university and its environment, but the reality in which this interaction takes place has many factors that with different origins and interests affect and characterize the reality that must undoubtedly be improved (CTS, 2014).

The link is considered fundamental to achieve a better competitiveness, as explained by the Secretary of Public Education of Mexico, Lujambio (2011), in the meeting of the Canacintra, when he stresses the urgency of "reactivating the link between the education sector and the business sector in order to strengthen the competitiveness of the Mexican economy, because through the industrialists, it is possible for the country to achieve sustained growth and broad development "(p.24)

The Salesian Polytechnic University (CTS, 2014), when referring to the link between university and society, presents the following definition:

"The link (...) is the interaction and synergy that is developed between the university and an actor or actors belonging to society, in order to concretize and carry out, processes that allow to reach the objectives and results of mutual interest declared by the parties involved".

In turn, the UCSG points out that link is a "function aimed at enabling the university community (UCSG) to institutionalize the most appropriate ways to respond to

the needs of the macro and micro environment in which it operates" (Franco, 2016)

These objectives and results of mutual interest should start from "points of contact" between the academic functions of an educational center and the functions of production and economic and social growth of the community to which the center belongs.

To find these "points of contact" it is important to analyze the modes of production of knowledge that historically have defined the university task. On this point Gibbons (1998) considers the following modes:

- Mode 1: that is generated within a disciplinary context, fundamentally cognitive. This mode is homogeneous, and in it "problems are posed and solved in a context governed by the interests, mainly academic, of a specific community."
- Mode 2: which is transdisciplinary, heterogeneous, and "is more socially responsible and reflective; it includes an increasingly broad, temporal and heterogeneous set of practitioners who collaborate on a problem defined within a specific and localized context."

With the emergence of globalization and the new means of teaching, the master class has evolved and the professor has become an "intermediary of knowledge", who can indicate to his students the simplest way to get the knowledge that he is trying to give them, through resources that are available to the students.

This evolution leads to what Garrido, Rondero and Vega (2013) mention as mode 3, which is a model for a "more comprehensive interaction of the university with the social environment to address the new demands from a systemic perspective that includes the problematic of the relationship with production in the framework of the set of social needs". (P.11).

Whatever the prevailing approach, the fact is that the production of knowledge of the university depends on the modes of production and their evolution. They can now address specific needs, since there are now many more paths available for the production of knowledge than there were throughout the centuries of existence of universities in general.

Given the urgency of educating professionals who are aware of the problems and needs of society by applying the knowledge they receive in classrooms in order to put it into practice by linking to the national reality and generating actions to improve the quality of life of the inhabitants, the fundamental elements of the model to be developed are proposed.

With the approach of the problem-solution relationship, the outline of the link model is started. The student must go out to the society to look for the "problem", and bring it to the university, so that, as an institution, it generates the "solutions" proposals. The university, institutionally, has to focus on its role of providing specific solutions to a specific population, because the production and

transmission of knowledge that are generated in the university, will fall into a specific population segment, and therefore, this link, must also be specific. The link should then establish the "points of contact", within the economic, technical, academic and social assistance field, for the "problem-solution".

In relation to the study of the link between university and society, within the concept of "Social Responsibility of the University", developed by the Center of Studies for the Improvement of Higher Education - University of Havana - CEPES and La Sapienza (University of Rome), it is pointed out that the "third mission" of the university is the "direct provision of resources". This third mission is developed in three areas: Technology Transfer, Continuing Education and Social Commitment. (Benvenuto, 2016, p.56)

These areas of the third mission are developed within the framework of the link between government, university and business, which in their knowledge exchange are part of community development producing new knowledge, through the generation of new technologies, or development and research for the business innovation.

It is of interest for the present research the point of view of Ranga and Etzkowitz (2013) when referring to the Triple Helix; according to this new concept there are different configurations between university, industry and government:

- A statist regime in which the government takes the lead by directing the academia and the industry, but limiting their initiative.
- A regime where industry is the driving force, while the academia and the state play a secondary role.
- A regime in which the university has a leading role, and acts together with the industry and government.

It is with this criterion, that the position of Ranga and Etzkowitz (2013) is taken into account when noting that the Triple Helix is a construct defined as a set of Components: Government, Industry and University, Relations between components and Functions.

With regard to the components, we emphasize that there is also the component of the common society, represented by cultural, religious, political, sports organizations, which are not part of the institutional spheres but generate needs that are satisfied by the Government, Industry and University.

### 3. SOME OBSTACLES TO LINK

As part of the study carried out, the need to develop a tool that helps to manage university - society link is highlighted. The study analyzes the configurations mentioned above and formulates the following remarks:

- Consideration of the needs of society, when requesting the participation of the university, as manager of knowledge, in the production of solutions to the

problems that arise regularly at global, regional and local level, will be contemplated by the model that is being founded. If we consider that the main actors are the State, Industry, University, and other organizations (religious, cultural, sports, among others), all of them must have participation in such a model.

- The university commitment is based on a motivational strategy towards students so that they know the social reality of their environment.
- According to the revised literature, the observations of Ranga and Etzkowitz (2013) do not consider a scheme in which the university takes the lead. Although the university has vocation of knowledge production, this knowledge must be interdependent with the other institutions that act in the Society. Without the help of the industry, it will not be possible to know the facilities for its production or commercialization. In this case, the participation of the university, although academically useful, could not render the necessary benefit to society.
- Promoting the transfer and exchange of learning between community and university, bringing the student and professors closer to a real context through projects that generate positive impact especially in vulnerable groups of society, is an objective of the link with the university.
- The position of the authors is that all actors in society must be present in the model, if the model is intended to give rise to a process of link that meets the requirements of all sectors. From its role of producer of knowledge, the university must interact with everyone, respecting the roles of each one, in order to know what the real problems are, and therefore to propose the solutions that it considers pertinent.

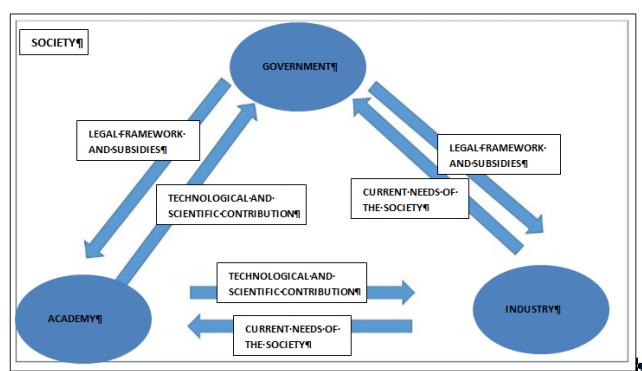
In an analysis of the obstacles that are presented for the link to be fulfilled in our environment, we highlight the works of Castañeda (1996, quoted by Saavedra, 2009), and the authors of the Triple Helix Etzkowitz, H. & Leydesdorff, L. (2000), who establish as main concerns the following:

- Lack of educated professional researchers
- In general, both the educational sector and the business sector have not had a real policy or the relevant regulations to generate link, and this is due to the lack of concern on the subject.
- It should be noted that the cultural difference in these sectors has not allowed for adequate communication
- On the other hand the purposes that encourage the two parties do not have the same validity for the one as for the other.

In order to overcome these obstacles, specific objectives must be proposed, with approaches that allow an appropriate link of the university with the society. In this context, and as part of the research, work is being done on the basis of a linking model that, in the light of existing

research on the Third Mission of the university, can overcome the aforementioned obstacles, so that it is feasible within the Academic point of view, and at the same time generates knowledge that can be applied to society as a whole.

In view of the above, the authors' position is that the Triple Helix cannot be considered in a purely theoretical way, as an isolated concept that feeds on information generated in other countries, whose realities do not fully coincide with Ecuadorian reality, nor with that of the Catholic University of Santiago de Guayaquil, that includes the field of action of this study. Figure 1 shows the elements involved in the model.



**Figura-1:** Elements that intervene in the model. Own elaboration.

#### 4. DISCUSSION

In light of the above, we consider that the Triple Helix should be analyzed in the context of the components of the society to which it is applied, including:

- The Government, to its most relevant actors, which are the departments responsible for the administration and management of Higher Education, and the corresponding administration with the resources available for education, with the corresponding percentage of State resources.
- Industry and the entire productive sector, both in traditional markets and those related to innovative sectors.
- The University with the revision of the contents offered in the career, the availability and profile of the professors, the academic improvement plans for the professors, and the recent trends in relation to the student population.

These elements and their relationships constitute the fundamental components of the management model for the link with the society of the career of Civil Engineering. Once the components are characterized, the focus must

not be on them but on the interaction (link) with each other. This link has to answer two questions:

- How does each of the components depend on the other two?
- What is the contribution of each one, for the benefit of the other two?

At this point, the authors consider that for these links the answer to both questions is in the following interactions:

- Government: with definitions of legal frameworks and subsidies applications
- Industry / trade and all productive sectors: by defining new needs
- University: with the generation of new technologies and directed scientific research

If one accepts Peter Drucker's view that present-day society is a post-capitalist society, described as an "educated society and a society of large organizations - official and private ones-that necessarily operate by virtue of the flow of information" (Peter Drucker, 1992, quoted by Viloria, 2005, p. 299), then current societies, unlike societies that existed before the advances of technologies of the middle of the last century - that allowed an almost immediate global participation of the information and knowledge - owe their growth and development no longer to agricultural production as in feudal times, nor to the improvements of production that occurred after the Industrial Revolution. Today societies are advancing and differentiated by the production and transmission of knowledge.

Thus, national development cannot be achieved without prioritizing education, since education will be the one that allows the flow of information - in the form of the transmission of knowledge - and will generate new information flows - in the form of production of new knowledge.

In this context, education responds to the public interest when it allows the knowledge transmitted and produced to meet the needs of the community. Thus, education contributes to society to the extent that it tends to know in the first instance the needs of the community and then establishes the appropriate paths for their solutions.

The UCSG states within its mission to "educate competent and socially responsible professionals for the sustainable development of the country." This social responsibility translates into the proposal of solutions that emerge from scientific research, and then reach the community through participation, on the one hand, of the industry that produces and commercializes the results of the investigation, and on the other, of the State, which generates the channels for their implementation.

An example of this university - society link is the experimentation of non - traditional materials for the construction of low - cost housing, where the university

knows the need of the Society, through economic indicators, then brings its knowledge in a controlled environment to produce or discover a new tangible good, that has passed tests with scientific rigor, demonstrating its fulfillment of the known needs. Then, this tangible good, can be produced on a large scale by the industry, to reach the final beneficiary. The State, throughout this process, serves as a regulator, financier, and ultimately as a beneficiary.

This brief example is linked to the Civil Engineering and Architecture careers; however, each of the academic units has its own functions and therefore its own ways of action. These paths of action can only be found and implemented through an appropriate link between the University and the other components of the Society, so that the Academy's knowledge generation is not only useful for scientific enrichment but also for improving the conditions of the Society to which it belongs.

## 5. CONCLUSIONS

- The triple helix model serves as a basis for establishing the link of the Civil Engineering career with society, by using the data of each country.
- The fundamental elements that will be incorporated into the management model for the link with the society of the career of Civil Engineering of the Catholic University of Santiago de Guayaquil were identified.
- An analysis is done of the main obstacles that are presented so that the link fulfills its purposes. The solution of these obstacles is the fundamental objective of the research work.
- The diagnosis made evident the need to transform the management of the university - society link in the Civil Engineering career, starting from conceptualizing it as an educational process that has a positive effect on the relations with society.
- Given the characteristics of the international and local context in which the Ecuadorian university moves, it is essential to understand the role that can play an adequate management of the link of the Civil Engineering career in university development.

## REFERENCES

- [1] Benvenuto, G. (2016). La tercera misión de la universidad: la interacción directa con la sociedad civil y de educación para la ciudadanía. Universidad 2016. 10mo. Congreso Internacional de Educación Superior. XIII Taller Internacional de Extensión Universitaria.
- [2] Ciencia Tecnología y Sociedad (CTS). (2013). Desarrollo del vínculo universidad-sociedad en el Ecuador. Recuperado el 24 de noviembre de 2016 en: [https://www.google.com.ec/?gfe\\_rd=cr&ei=dW81WYWDL6zLXpP6sbgl#q=v%C3%ADnculo+universidad+sociedad](https://www.google.com.ec/?gfe_rd=cr&ei=dW81WYWDL6zLXpP6sbgl#q=v%C3%ADnculo+universidad+sociedad)
- [3] Etzkowitz, H., Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university-industry-government relations (2000) *Research Policy*, 29(2), pp.109-123. Elsevier. Recuperado el 24 de febrero de 2016 en: <https://es.scribd.com/document/61400759/Etzkowitz-h-Leydesdorff-l-2000-Triple-Helix>
- [4] Franco, M. (2017). Políticas de gestión de la vinculación en la Universidad Católica de Santiago de Guayaquil. Vicerrectoría de Vinculación. Guayaquil
- [5] Gibbons, M. (1998). Pertinencia de la educación superior en el siglo XXI. Documento presentado como una contribución a la Conferencia Mundial sobre la Educación Superior de la UNESCO. Recuperado el 18 de Octubre de 2016 en [http://www.humanas.unal.edu.co/contextoedu/docs\\_sesiones/gibbons\\_victor\\_manuel.pdf](http://www.humanas.unal.edu.co/contextoedu/docs_sesiones/gibbons_victor_manuel.pdf)
- [6] Garrido, C. Rondero, N., Vega, V. (2013). Innovación, vinculación universidad-empresa y desarrollo. Desafíos y posibilidades de la Redue en el espacio ALCUE. Universidades, vol. LXIII, núm. 58, octubre-diciembre, 2013, pp. 6-23 Unión de Universidades de América Latina y el Caribe Distrito Federal, Organismo Internacional. Recuperado el 7 de febrero de 2016 en: <http://www.redalyc.org/pdf/373/37331247003.pdf>
- [7] Lujambio, A., (2011), Secretaría de Educación Pública, Boletines 2011, Comunicados marzo 2011, comunicado 023, Necesario reactivar vínculo Universidad-Empresa para fortalecer competitividad de la Economía, Alonso Lujambio, Recuperado el 24 de febrero de 2016 en <http://www.sep.gob.mx/es/sep1/C0230211>
- [8] Ranga, M., Etzkowitz, H., (2013). Triple Helix Systems: an analytical framework for innovation policy and practice in the knowledge society. *Industry and Higher Education*, Volumen 27, Número 4, Agosto 2013. IP Publishing Ltd.
- [9] Saavedra, G., M. L. (2009). Problemática y desafíos actuales de la vinculación universidad empresa: El caso mexicano. FACES, 12(19), 100-119. Recuperado el 17 de Octubre de 2015 en <http://www.saber.ula.ve/handle/123456789/31141>
- [10] Viloria, O. (2005). Reseña de "La sociedad poscapitalista". Revista Venezolana de Análisis de Coyuntura, vol. XI, núm. 1, 2005, pp. 324-330. Universidad Central de Venezuela. Caracas, Venezuela. Recuperado el 11 de Noviembre de 2015 en <http://www.redalyc.org/articulo.oa?id=36401114>

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