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Bernardo Herrera, Astrid Jaime, Dominique Vinck

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Mediator Agents of Knowledge in Glo/Cal Networks: What role play the research groups of Los Andes University in Bogota?

HERRERA, Bernardo

Dirección de Investigaciones - Universidad de los Andes
Carrera 1 No 18A -10 Of. CJ. 201/Bogotá, Colombia

bherrera@uniandes.edu.co

JAIME, Mireya Astrid

Dirección del Conocimiento, Universidad Industrial de Santander
Cúcuta, Colombia

dirconocim@uis.edu.co

VINCK, Dominique

Direction - CRISTO (Centre de recherche: innovations socio-technique et organisation)
Université P.Mendès-France/ BP 47 F-38040 Grenoble cedex 9/Francia

Dominique.Vinck@upmf-grenoble.fr

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ABSTRACT

Purpose – Through the Mediator Agents of Knowledge (MAK) analytical lens, this paper shows the role played by some of the research groups of Los Andes University in the context of metropolitan area of Bogotá. The question is: which of these groups are, could be or could become MAK? **Design/methodology/approach** – The paper uses the ISI-Thomson and SCOPUS citation index to classified and select Los Andes research groups more visible within international communities. Each one of the selected groups is studied and all of them are systematized in order to find regularities vis-à-vis MAK notion. **Findings** – One type of group acts in certain way as a mediator agent, because of the role they play, not only on the global scenario, but particularly because the role its director plays as inter-actor coordinator among institutions in Bogotá. This Glo/cal role could be partly explained by the characteristic sector where this kind of group develops its research activity: ‘mediate sector complexity’ (Sorenson 2006). **Practical implications** – The traditional findings accepted from learning region and territorial innovation system approaches are in question on the recently knowledge economy conditions. The global scenario where the research groups develop their activity is signed recently by functionally links instead of geographical proximity. Those approaches could apply only in some kind of sectors, where nowadays, the agglomeration condition of a city and the interdisciplinary networks of knowledge still play a complementary interaction.

Key words: mediator agent, social network analysis (SNA), glo-cal, knowledge, network, city, research laboratory.

PRESENTATION

The future of the city within a globalized economy is not necessarily that of innovative milieu for incubating urban learning process. There will be a new determinant actor; we talk about the academic community, particularly, the laboratory and research group working at a knowledge frontier.

The ability to inter-act of senior leaders of these laboratories, the capacity to delocalize the researcher, the possibility offered by the new information and communication technology, are, all of them, favorable conditions to incubate Mediator Agents of Knowledge -MAK-¹. However, not all research groups could play a MAK role. This capacity depends on the context - global or local - we are talking about. For that reason, we are interested in determining which research groups in Los Andes University play a MAK role in glo/cal networks having a node in Bogota. In order to answer this question, in the first part of this paper we develop a theoretical discussion around the role objects may play in scientific networks. We also discuss the concept of coordination within scientific communities. Finally, we identify the MAK characteristics in glo/cal university context. In the second part, we show how, through the Mediator Agents of Knowledge (MAK) analytical lens, some kinds of Los Andes University groups played both in the global as well as in the local scenario. This second section concludes with some graphs to illustrate the methodological utilities of coauthor network analysis for understanding de Mediator Agent of Knowledge role played by such particular laboratories.

Based on the case studies, in the conclusion we call the attention why only in some particular kind of sector it is still possible to talk about territory innovation system and learning regions.

I. FROM LEARNING AND INNOVATION NETWORKS TO GLO/CAL KNOWLEDGE NETWORKS

Bogotá has some research groups and university laboratories from where is consolidating what we call in this article “Mediator Agents of Knowledge -MAK-”. In this first part of the article, we will answer the question: which are the urban dynamics where act such agents MAK.

1.1. Cities as learning regions

According to the literature, two conditions characterize certain cities as nodes of learning regions: the first one, that the cities articulate socio-organizational learning and the second, that the cities link territorial production systems. We are referring to two learning dimensions: Institutional and technology changes. A given region will evolve thorough learning path as quickly as it evolve through qualitative loops on both directions.

A given node progresses in the learning direction, if it acts in favor of these two qualitative changes. In some cases, the city acts in favor of industrial innovation development (innovative cities). In other cases, the city enhances changes on high-tech and high-complexity knowledge sectors (knowledge cities). More recently, it emerge

¹ For a first paper about MAK notion see Herrera (2004)

the so-called 'elite class', characterized by the artistic and creative urban development (creative cities).

These three recent conceptions of the new city put in question the traditional postulates of the so-called learning regions and the territorial production system approaches, both of them clearly oriented by the endogenous development theory. Contrary to this later approach, there appear questions when some groups inter-act with partners outside the city, or, when it builds partnership that chain the territorial organization with global networks.

In order to solve these gaps of the endogenous development approach, we propose to define the agents presenting linking capacities: Mediator Agents of Knowledge -MAK-. In some cases, this capacity of acting as MAK is produced around some *objects* around which a new trajectory is built, while, in other cases, that mediator role is developed by *subjects*, who enhance the socio-organizational learning.

1.2. Mediator *Objects* and *Subjects* for Knowledge and Innovation

Not only on the socio-organizational, but also on the productive levels, particular objects or subjects play an intermediation role for new knowledge. Vinck (1999) identifies four possible mediations promoted by objects on scientific networks²: 1) As exchange Forum; 2) As Mobile Equipment; 3) As Fixed Equipment, or, 4) As Industrial Prototype. These four types of objects could be nominated MAK. As we underline on Vinck's text (see first footnote) those objects partially explain collective divergent dynamics. The other part of the explanation could lean on MAK *subjects*. The object of this paper is to advance on a mediation typology originated on subjects.

There exist subjects as well as objects that could mediate on both dimensions discussed above for the territorial learning analysis (socio-organizational learning and the linking of territorial production systems). In fact, not only on the socio-organizational dynamics but also on the territorial productive process is valid to question what or who are behind those dynamics.

In order to answer these two questions, it is important to be clear about the process and dynamic sequences. The key question is to identify the moment when involutions start, when changes in the learning loop appear or when a qualitative jump happens. On those conjunctures, mediators operate.

² "... qu'elles [les entités physiques] permettent de révéler et de caractériser la nature des échanges et des relations entre acteurs humains, de dessiner les réseaux de coopération mais aussi d'accéder aux investissements et activités en amont, en cours et en aval de ces échanges. Sens, stratégies organisation, règles et conventions, lien social... tout cela émerge lorsque son pris en compte les objets intermédiaires. ... Dans d'autres réseaux, combinés à des intermédiaires mobiles qu'il met en circulation ou qu'il draine, il oriente les pratiques des uns et des autres. Au lieu d'être un instrument, par exemple, il peut s'agir d'un laboratoire central, c'est-à-dire un dispositif composé d'un ensemble d'appareils, de connaissances et de compétences accumulées et incorporées dans des chercheurs, dans de procédures, dans une organisation et dans des publications ... Ainsi, aux configurations d'objets intermédiaires fixes et circulants correspondent des dynamiques collectives fortement contrastées. Celles-ci sont révélées et s'expliquent partiellement para la nature et la circulation des objets, que les effets observés aient été voulus ou non par les acteurs." (underlined added to the original text).

These changes occur in each city on different levels. In some cities, it takes place on the institutional environment as a whole. In others, the changes arise at a few organizations, and there are cases where the individual agents - enterprises or public organizations- are the ones that start the changes. Finally, such qualitative jumps, could crop up, around an innovator project within a laboratory or university research group.

This observation of diachronic changes is particularly useful to observe the role played by some actors. Again, it is pertinent to remember Vinck's argument, in this opportunity based on his more recent work (2006), where the author underlines the inter-actor key role on the learning and innovation dynamics in Grenoble city. The meaning of the innovation concept in this work must be clear, it is understood in a socio-organizational dimension. Innovation is defined as profitability exchange in which the Mediator Agent of Knowledge -MAK- plays an important role. The MAK role is important to translate the novelty in order to response many actors' interests. The Grenoble experience is an example of how the technology trajectory is signed in its first stages by a sequential dynamics going from electrical sector, to microelectronic and recently to nanotechnology. In addition, such dynamics does not imply a historical fatality.

This experience shows how it is possible to successfully take advantage of the bifurcation. These kinds of examples show successful city cases where one can imagine new balances. There are important factors that play a big role. In the Grenoble case, there was a long history with accumulation of competences and local organization, which define a certain future in the fields of electricity, microelectronic and nanotechnology. Those dynamics could change because there is a less visible but real accumulation on the biology field, without enterprises until now. For understanding the recent industrial development, we propose to include the global dimension in the analysis. In the nanotechnology industry, it plays another kind of links, not only, with the local innovation system but also within a global market of technology. If the biggest enterprises decide to go for instance to India, it would possible generate a chaos period in Grenoble.

In Latin America, there are frequent studies that show the role played by the academic sector on the local innovation dynamics, during the last years³. It is pertinent to question if in an open knowledge economy this endogenous process could be limited if it is not articulated with the global markets. Recently, there appear city cases in Latin-American countries exemplifying this endogenous development. For instance, in certain industrial Mexican cities, some laboratories in public universities have developed innovations that those institutions maintain as industrial secrets in order to get long life projects for research groups. These examples permit, at the same time, to benefit the transfer of genetic improvement developments from the multinationals to be applied in the local consumption of agriculture production. Could the above dynamics be the one followed by the research groups in universities such Los Andes in a city like Bogotá?

This will be a permanent question behind this paper, by now, we can affirm that any given research group has, at least, two basic kinds of mediation mechanisms: through *objects* or through *subjects*. As hypothesis, we propose that on technological innovations the first is more important, while on the learning phase the second takes the

³ For a seminal discussion, see Yoguel, G. (1988). See also: López A y Lugones G (1998) and Casas R. (2001)

main role. As we see in the next section, this two mediations could be done independently of each other.

1.3. Functional Coordination for Building Learning and Innovation Networks

Based on empiric works recently done by Lorenson (2005), she questions learning regions and territory innovation systems. Starting with a critical discussion of these two endogenous approaches, the author opens the place to a globalization issue, where it acts as a determinant factor for a new logic on the articulation dynamics of knowledge.

The proximity question in this relation dynamic must be present to explain the knowledge transfer. The proximity could be geographic or functional. The first one is not a condition for the transfer of some special kind of knowledge. The physic distance is not determinant on pair's relations, for instance, between tutoring and tutored within so-called cognitive networks.

The questions of what and who are behind the mediation, comes again relevant on the coordination issue. A congress paper or his researcher could become nodal in particular networks. As stressed by Vinck (1999) when talking about objects, "its circulation imposes a logistic organization what becomes a central place on cooperative activities". It is very common that some particular mobile objects -as the laboratory sample- define the rules and behavior of research teams. When we talk about scientific networks, a subject could develop this central role. In this case such subjects become a coordinator node thanks to the role they impose and because of the legitimacy they rise as mediators. When there is a particular project identified, some persons emerge as institutional entrepreneurs, these people help build the convergence of actors.

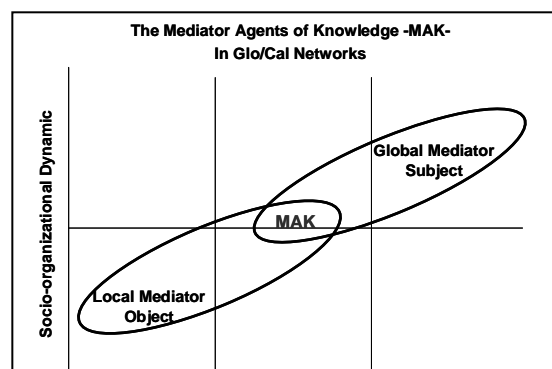
In conclusion, together objects and subjects offer mediation opportunities to research groups.

1.4. Universities as Nodal Actors in Knowledge Glo/Cal Networks

The critical discussion made above about some accepted approaches around knowledge geograph , placed the university as strategic node in a new map of relations. The higher education institutions become an articulated axe among academy, private sector and government. In addition, It becomes an agent for locally applying global knowledge.

Once understood the articulating function of a city as the generation of organizational and productive changes, it is useful to see what and who plays that role in a metropolitan area as Bogota.

We propose the MAK notion to characterize this mediator role. In order to understand the dynamics of a knowledge economy, we also propose the globalization dimension as a determinant variable. This variable has been particularly neglected on traditional 'learning regions' and 'territorial innovations system' approaches. Within this MAK notion, we propose the hypothesis that some particular groups in the universities could play a new role



(a mediator) when they articulate their activities with international networks.

Then, the changes introduced by some academic actors on the local production and on the learning process, are less determinant than its role as knowledge agents in global scenarios. It is possible to affirm that “the local issue” is not anymore a sufficient condition, but it is not even a necessary condition for the development of research in sectors of moderate complexity⁴.

Nowadays, knowledge geography shows how the best practices depend on functional proximity relations. One metropolis attracts the localization of actors because in that city exist research groups and universities as well as services the city can offer to link potential partners. The so called “knowledge workers” change places easily on national and international levels. The localization is increasingly defined by function.

In this context, the conditions to identify the Mediator Agent of Knowledge -MAK- playing on Glo/Cal networks exist. Here, the discussion of mediator objects and subjects and, particularly, their role as learning and innovator coordinators within knowledge networks, is again important. The key is to identify when the group is starting the breaking moment. In this key moment can be crucial a team member or, in other cases an artifacts used on research project.

The key question is the problem of “translating” from the personal knowledge of a person or group with their bodies, documents, instruments, tools and organizations, to the knowledge that someone else can crop and rebuild into a network of bodies, documents, instruments, tools and organizations. This is the reasons why it is important to see the mediations process between the researcher and the scientific networks of his international community, between researchers and enterprises, among enterprises and among researchers of different disciplines.

As it is noted above, these relations of geographic or functional proximity depend on the sector. In certain knowledge areas, the tendency is to privilege the articulation with colleagues of certain level of abilities, whereas in other thematic areas it is not the case.

Our interest is to find out in which learning or innovation cases there have been agents who have contributed by playing in supra-local scientific networks. We propose as a first approach to dimension that contribution, to study the bibliometric production of those agents, even though, according to Millan (2004), this kind of analysis reminds us of “cold science” questioned by Callon. From our point of view, this is a reasonable start point to identify the mediator agent from global to local sphere, when talking about scientific networks. In this sense, we agree with Arellano (2004:142) when he argues that “the links depend on “action scopes” where agents play: “...following this definition of localization we can free from the guiddensian postulate of globalization understood as the separation of the spatial and temporal dimension... The actors, such as enterprises, institutions, government, etc., which work on non-global scenario, are local players, but the actors which play globally are local players too.” From our point of view, this is a correct approach to identify the mediator agents, starting from global

⁴ As usual when this kind of discussion becomes a polarized issue, examples in favor and against of both extreme positions emerges. There will be examples where the geographical conditions start the MAK role.

scale. The next step is to demonstrate or disprove its role on local networks. We have taken care to verify with each expert during the interview the citation graphs. The later process was done in order to minimize the reasonable critics made to such studies. According to Sanz-Casado (2007), “this is an important aspect in the methodological approach to any bibliometric study on the development of scientific research in a given field”.

We postulate a final hypothesis that the Mediator Agent could be an object (material or non-material) or a subject, for the case of Higher Education Institutions could be an integrant of a research group. This group plays on Glo/Cal Networks when the changes it enhance goes beyond geographic dimension translating on functional relations. These geographical proximity or functional relations change depending of each sector. In certain knowledge areas is determinant the interaction within academic community and local agglomeration, but not in others.

II. LOOKING MANAGEMENT MODELS OF RESEARCH AT LOS ANDES UNIVERSITY, FROM GLO/CAL KNOWLEDGE NETWORK LENS.

In this section it is presented the study of the cases analyzed by Universidad de Los Andes to respond to the question, if the management of the research conducted by some of the groups of this University makes them able to be considered as “Mediators Agents of Knowledge” -MAK-.

As discussed in the first part of this paper, such a mediation role can be developed by those who conduct research laboratory or it can be observed through the objects, around of which labors are coordinated in scientific communities’ network. We are talking about mediation subjects or objects in knowledge networks.

2.1 Selection methodology and analysis of Research Groups

There are two interests in studying the research groups of Universidad de Los Andes, the first one is it that outlines its innovation and learning trajectories within both the local and the global context, and the second one, is it that sees if along that trajectories, changes in the Knowledge Mediators –MAK- direction are produced. Within the context of both the University and the Colombian scientific community, a researcher is defined by its output; and, within the global context, it is defined by its international insight given its articles or patents production registered in information indexed bases. Following the analysis model posed in section I, we prefer to take as the first criterion for the cases study, one of the most used visibility indicators: the citations on international indexed magazines. According to the adopted definition, “the global” and “the local” are defined as the scopes where the agents act. Global are those researchers whose acting scope is supra-local, and, as a corollary, the remaining researchers act in no-global scopes⁵. According to the foregoing, from the methodological point of view, the initial step consisted of quantifying in two of the most known bases of citations (SCOPUS and ISI-Thompson) those articles of Universidad de Los Andes researchers

⁵ The criterion behind this definition is that which weakens the differentiation made by Guiddens of the local against the global by the localization, distances between one and the other are not associated to time and space (Arellano: 2004)

who have received a greater number of citations⁶. Researchers are selected from those areas in which Universidad de Los Andes counts on faculties by following the methodology adopted by Observatorio Colombiano de Ciencia y Tecnologia according to UNESCO classification: 1) Socials and Human sciences, 2) Exact and Natural sciences, 3) Technologies and Medical Sciences and 4) Technologies and Engineering Sciences. In each area, are selected the group to which the author with greater number of articles and citations belongs to.

Common are the doubts on the analysis originated from the bases of indexed magazines. The discussion of the pertinence of the bibliometric analysis is far from the objectives of this paper, what we can affirm is that these bases about indexed articles information have enough acknowledgements due to the requirements and protocols demanded by the selection and evaluation process. In addition, in order to avoid some of such troubles, during the interview validated were the citation maps from the expert view. This by the time of tackling the visibility subject of the research groups main members. In short, the information reviewed complies with the purpose of segmenting and selecting the University researchers' sample, starting from an international recognized criterion: the visibility in scientific knowledge networks. In diagram No. 1 the main issues resulting from the researchers' interviews are shown. The two main elements of interest are, on the one hand, the qualitative changes given in the group trajectory; and, on the other hand, the role played by the coordination of the scientific activities in such moments of breakage around the central "objects" or "subjects" of the research.

Diagram No. 1
Context of production, change factors and mediation on the case studies
of Los Andes University

	GROUP	Main sector of production			PRODUCTS	CHANGE FACTOR	Mediator Agent -MAK-	
		ACADEMIC	PUBLIC	PRIVET			OBJECT	SUBJECT
EXACT SCIENCES	Experimental physics in High Energies	+			Publications International networks	Interdisciplinary learning Doctoral Student	Measurer for Particle Multiplier	Pos-Doc Colombian Pos-Doc Fermilab
	Physics of the Condensed Matter	+			Publications Hispanic America Networks	Glo/Cal Network	Local forum and National School	Doctoral Student
ENGINEERING	Biomedical Engineering	+		+	Publications Patents Local/National Networks	Model of Utility. Adaptation Local/Glo/Cal	Hemosustitutos	Leader Group

⁶ SCOPUS groups:

- 1) Socials: Social Sciences, Business, Management and Accounting, Economics, Econometrics and Finance, Decision Sciences and Arts and Humanities;
- 2) Exacts and Naturals: Physics and Astronomy, Mathematics, Biochemistry, Genetics and Molecular Biology and Materials Science and Chemistry;
- 3) Medicals: Medicine, Pharmacology, Toxicology and Pharmaceutics and Nursing;
- 4) Engineering: Engineering, Computer Science, Chemical Engineering and Energy
- 5) Agricultural: Agricultural and Biological Sciences y Veterinary.

MEDICAL	CIMPAT - Research Center in Microbiology and Tropical Parasitology	+	+		National Practical Standards	Technological Change	Weave samples	Scientific Management
SOCIAL	Management and Organizations			+	International Strategic Alliance	Protocols Academic Network	Methodology Case Studies	Social Entrepreneurial Network

2.2. Context and changing factors on the trajectory of the research groups.

It is important to start with the differences and to take into account the context in which the knowledge produced by the research groups is used or applied. Three main contexts of application allow the differentiation of the interviewed groups.

- a. In the first place, the user of the group production is the Academic Community: Groups of Exact Sciences.
- b. The new knowledge products are addressed mainly to the private sector: Group of the Engineering area and Group of Social area.
- c. The group production is used mainly by the public sector: Group of Medical area.

It is useful to see which have been, in the judgment of the interviewed, the kind of changes marking the breakage key moments in the group trajectory. With no exception, in all cases informal events play a role giving rise to long-term alliances. Such informal events are achieved in international academic encounters.

Scientific production during the training process to get a PhD degree is one of the most significant changing factors. This applies particularly to the group of Physics of High Energies, due to the possibility this first publication gives it to be visualized at international level. Within this same group it is worth pointing out as a key factor the interdisciplinary training achieved in pregraduate studies of the candidate student to get a doctoral degree. The first of the articles published by this student calls into question the measurements made by the unique other laboratory of high energies with recognized international prestige on the world.

For the rest of studied groups, in one or other way, the doctoral training of the students integrating the group is very important in the visibility obtained from them by the University in international indexed magazines. In all four cases, the products apt to be visualized are obtained by international co-authorship.

The trajectory of the Biomedical Engineering group is marked by three moments. The first is about the domestic knowledge development, the second is about the validation of such development within a scope of global extension, and, the third one deals with the adaptation to the domestic context again. Once these three moments are met, the next step is to request the patent from Superintendence of Industry and Commerce.

For the case of the health sciences group, the changing factor is achieved by the application of new molecular biology techniques. Thanks to a new applied technique, the laboratory makes its experiments with imported tissues, as opposed to the time when

it depended from the biological material of local or national origin for such experimentation.

Finally, for the case of social sciences, the changing factor lies in the strategic alliances through the University. The links to be established are possible thanks to the recognizing of the Business Administration Faculty as a high-level Business School within the Latin American context.

This last issue is common to the total of the studied groups. In effect, the environment and acknowledgment of the University before public, private and academic actors play an important role at the time of introducing new knowledge.

2.3. The Global/Local measurement in Uniandes Groups

This is a very important issue when it comes to cases analysis. It is obvious the difference between the exact sciences cases and the three remaining analyzed groups. In one or other form, for the former the objects at global level are in between, while in the latter ones such mediation goes around the researchers coordination; at Latin American level for the case of social science and medical groups, and, at the local level in Bogotá in the case of Biomedical Engineering group.

The physics groups both Experimental of High Energies and Theoretical of the Condensed Matter have no any restriction for the localization of the integrants.

Researcher can be ascribed to any institution located within a country, city or university, with such a localization having to do in nothing for the role the researcher plays in the research. The clearest case is that of the experimental group, which requires for the collection of data, a long process of design, calibration, test and installation of a detector of high energies. Such a detector is made in a coordinated way between physics and engineers during some apprenticeships in Fermilab laboratory in Illinois. The activities developed in function of the high energies calibrator, force the Universidad de Los Andes researchers to move to other places in order to work in coordination around this device. Such an object is then, a determinant object in the knowledge measurement, given that around it protocols are established beforehand for the researchers to participate in the measurements taking. In the next stage of data evaluation, the localization is not restrictive allowing the researchers to return to their origin countries or cities. In this stage, the High Energies group researchers have no any inconvenient to hold a weekly seminar through videoconference, which is moderated from Illinois with pre-established agendas by participants in Campiñas (Brazil), Spain and Bogotá (Colombia). The foregoing explains why is it that mostly of the authors that cite the experiments developed by the High Energy Group not even are from those cities where the particle multipliers are located (Illinois – USA – and Cern – Switzerland). In effect, by observing the co-authorships grapho with one of the researchers of the group, apparently those who cite the Universidad de Los Andes work are not even experimental physics, but, theoretical ones who use the group results to verify new postulates in the subject. This possible explanation is ratified precisely for the case of the Research Group of the Condensed Matter. Briefly, this group is a good example of the a-spatiality of its researchers localization. However, about the “translation” of the new knowledge at Colombian level in which the researchers act, there is a significant fact; in both cases (theoretical and experimental physics) we count on an uninterrupted

weekly forum for more than ten years in which scientific community has been constructed inside Uniandes. This seminar has served as a mediation object, with the particularity that for the case of the Group of Theory of Condensed Matter of having been the origin of a nationwide researchers network in such specific field: “Physics National School of Condensed Matter”. In 1996 attended, among other international guests to the second bi-national encounter of such a School, a Spanish fellow who today after twenty years has continued releasing publications along with the founders of the group. As a conclusion of the case analysis on the exact sciences area, the doctoral students and the links they establish with global networks are the reason for the qualitative changes allowing them to make part of knowledge international systems.

Below we introduce the other three analyzed cases where some particularities are in place helping to understand the mediation role, this time not about the objects but about the researchers in these global/local networks of the knowledge.

A reference was made above regarding to the particularity of the Biomedical Engineering group. This group is the best example of a generation/validation/adaptation case and use of a new knowledge technologically applied. Here the object (hemostitutives) seems not to play the mediation role which is evidenced in the aforementioned case in which the artifact of Fermilab laboratory is an important part in the coordination. Such a role seems to have been replaced by the technological training and application trajectory followed by the researchers along its formative process. In particular by the current director of the group who, due to its training and interest plays the role of inter-actor by serving as a knowledge vehicle between the medical biological and technological sciences and between the actors of the high education institutions (Universidad de Los Andes) and the private sector (Fundación Cardio-Infantil) in Bogotá. In effect, the breakages in the group constitution process between these two institutions are marked by the academic trajectory of the current director. He is the one who coordinates the first experiment of vascular prosthesis developed in the country, such experience help him to the validation during his thesis in master degree and PhD and, finally, to adjust the experimental model once he returns to his country. None of the two institutions in which the experimentation process starts keep this kind of tests during the absence time of the Uniandes researcher, such tests are resumed at his return; since then, they are uninterruptedly repeated up to date.

According to a testimony of the researcher, a significant fact in this second study case is that the know-how applied in Bogotá allows opening a research line at the director laboratory of his thesis in Austin about the hemostitutives subject. The subject developed in Colombia by the group director helps him to mediate as a researcher within a new knowledge global network.

Likewise, it could be affirmed about the know-how in the social field developed by the researcher of the case of the Management and Organizations Group. In this third study case, the mediation is the methodological character. In effect, the qualitative perspective privileged by the thesis developed during his doctoral training makes up the quantitative sight of his thesis director. Here the mediation is useful for the researcher. The know-how developed to make cases study gives it, years later, the entrance to a research network in the subject of the entrepreneurial social responsibility Enterprise Knowledge Network in which nowadays is the Colombian node and through which Latin American cases are systematized based in a North American methodology.

Such a methodology is now in the process of being replicated in the Asian countries thanks to the adaptations introduced to the cases model as from the South American reality. The subject (researcher) intervenes for its innovation in the making of cases (object) be relevant in other global scope.

The last case under study is the group of the health area, where the local conditions in mediation obtain a singular importance again. In this case, the particularities of the tropical diseases are the factor giving rise to the laboratory creation. The laboratory experimentation in samples of diseases tissues in the particular conditions of countries as Colombia makes of it an important condition as an object of knowledge mediation. This research subject has been quantified since about ten years ago, thanks to the use of techniques such as the Molecular Biology. Based in such techniques the research line is consolidated; this time not as from the tissues cells in those endemic zones with the Cruzy Trypanosome in Colombia, but these samples are being replaced by tissues of mummified bodies from 5.000 and 10.000 years old. In this case the change plays a role on the complexity of the experimentation techniques when shifting from micro to molecular biology and such leap has allowed it to broad its scope and to adapt its knowledge initially of application at local level at a global scale.

Finally, some regularity can be pointed out as from the trajectory, the changing factors and the mediation agents. If you see the type of products, mostly of the cases the objects intervening, that is, around of which the research activities are coordinated, do not restrict the localization as mediation agents. Such is the case with the experiments made in Fermilab, as well as the seminars in physics some at global level in high energies and another at domestic level in condensed matter, or with the tissues having centuries of conservation and finally, the case of social undertakings.

In the latter and giving its complexity level, the technically standardized protocols are enough for its application to be made irrespective of the proximity to the knowledge mediation object; while, in the first three ones the object complexity level and the analysis techniques are as much as high that the proximity to those places where the experiments are held, is not a determinant to adopt the knowledge.

Again, the biomedical case is a particular case, since in it the proper conditions of the experimentation context exercise a greater incidence.

Should both the University laboratory and the experimental surgery room of Fundacion Cardio-infantil are not located in the same city, the tests could not be conducted with the seriousness demanded by this kind of researches that can be qualified as medium complexity.

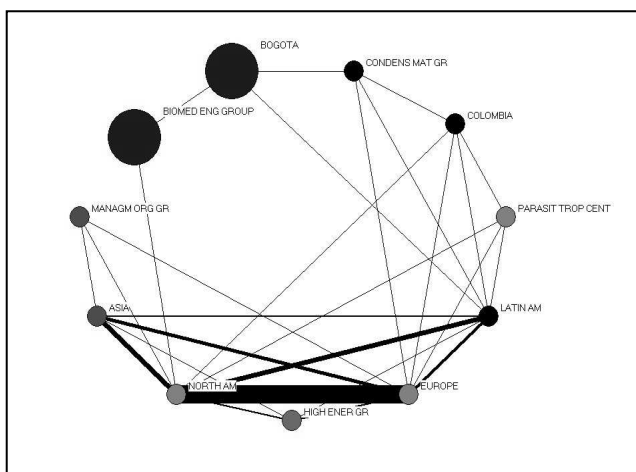
The research groups count on certain favorable inertias whether it is towards the globalization or towards the local networks construction depending on the following time line: first of all, it is decisive the knowledge or discipline area in which the academic trajectory of its main researches act and influence at the same time (the place and language where the post-graduation studies have been conducted, the links permanence with thesis directors otherwise with peers at the specialization university institution, etc.); in other level the context of the research application plays a role and if it is replicable to the several different contexts; and lastly the financial factors have

some incidence such as the capacity to attract or to apply to international funding sources and the ability to pose in first place the development of networking researches otherwise comparative projects as from the national or local experiences.

According to the pertinent analysis, three different sequences can outline the local/global trajectory of the researches:

- *A trajectory marked by the scope of the global acting and by the **subject** as a mediator agent:* this first scenario reflects the case of the research group on the social sciences area in which the subject is related to Latin American set of problems. In this first type “global translations” are achieved since such set of problems help explaining or predicting generalized situations in other contexts. That’s why the “Enterprise Knowledge Network” has the possibility of being transferred in order to be applied within the Asian countries context. (See Management and Organizational group on graph, next page).

- *Trajectory marked by the scope of the global acting and by the **object** as a mediator agent:* The second type reflects the cases of those groups under study in exact sciences. For them, the knowledge mediation is equally for the concerning set of problems of international networks except that the one who investigates has here a lesser relevance than that investigated, namely, the object defines the production coordination of a new knowledge. (See graph: Condensed Material and High Energy groups)



- *Trajectory marked by the scope of the global/local acting and by the **groups** as a mediator agent:* The most complex case is that of the biomedical group, as from which, postulates of recent studies about the dissemination of the knowledge are proved. Through the analysis of patents quotations, Sorenson (2006) concludes that in those sectors such as the biotechnology -that could be dubbed as medium complexity- both the social proximity (be read as functional) and the geographical proximity play a role in the knowledge transference (See Biomedical Engineering group). This latter typology can also be included in the case of the medical sciences group (Parasitological Tropical Center on graph).

CONCLUSIONS

In this paper the conclusions on the city future are called into question from two of the most generalized perspectives on the analysis of the knowledge geography (learning regions and innovation territorial systems).

The findings of these two approaches are called into question within the recent conditions of the knowledge economy. The globalization in which the research groups develop some proficiency is more and more marked by the functional links, as until some time ago, because of the geographical proximity. Such approaches continue to be applicable just in certain sectors, in those being complemented today, on the one hand, the crowding conditions typical of the city, and on the other hand, the knowledge interdisciplinary networks.

Within such networks, it seems that new key actors are arising; we are talking about the academic community, particularly about laboratories and research centers in those sectors of high complexity. In such sectors the ability to interact on part of the laboratory leaders, the researchers' ability to relocate themselves and the possibilities offered by the new information and communication technologies are them all the proper conditions to incubate Mediator Agents of Knowledge –MAK- in the university environment, particularly within the scope of a global acting. In these sectors the crowding condition normally offered by the metropolitan areas, today can be replaced by those conditions offered by the high technology laboratories. This is equally certain for those sectors of low complexity; a laboratory under these second types of sectors does not require of being located in geographical basis near to the knowledge source for it to adopt the knowledge and appropriate of the earnings it offers. Both of these sectors that of the high and that of the low complexity make the groups wherein they are working to be linked thanks to the proximity conditions which are functional within a dynamics in knowledge networks. In both cases it is weakened the thesis according to which, the nearer and less codified, the greater possibilities to mediate in local learning and innovation networks (Herrera 2001). Today these two conditions are under question when it comes to explain the knowledge geography. The geographical proximity by its own is not enough to create synergies and interactions even if it facilitates them. The “mediate complexity sector” is the only one in which the cities crowding conditions continue to play a role. This conclusion is based in the study of reviewed cases in this paper. The research directors of the groups involved in this kind of sectors are probably those who best can perform the MAK role in not only global but local networks of the knowledge.

The reasons that best explain why in this scenario with greater probability arise the Mediator Agents are due to the interdisciplinary character being offered by both the High Education Institutions and the environment of the inter-institutional relations generated by the city. In these two conditions the knowledge networks grow and get denser. In these sectors it is possible to capitalize the crowding advantages and to empower the urbanization conditions. The first one centripetal and the second one centrifugal. The former local and the latter global. The distance plays a role in those cases of technological development of intermediate complexity. Behold an interesting field for future researches, in particular to study the “translations” of those groups and laboratories on the engineering areas. With the analysis of these translations, it will be possible to prove the Latour's original postulates (1986). In this very known work, the author demonstrates how some few persons enter into some places to modify other places and the life of the crowds as well.

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