Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico

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Abstract

Research's relevance and social impact are essential criteria to evaluate if the research produced in universities fits society's wants and needs. There is a growing interest in these two elements that have increased publications that explore the most effective ways to evaluate research projects from this standpoint. There are various papers addressing evaluation from a statistical and bibliometric perspective. This paper delves into the experience of creating an evaluation for social relevance and social impact in research through a series of qualitative indicators brought about by consulting researchers themselves. The procedure was conducting six focus groups with 39 Autonomous University of Baja California researchers, organized by different fields of knowledge. The information submitted for analysis from the participants' discussions delved into their experience in both categories. The results point to 5 indicators linked to the relevance, 8 to the impact, 3 to the research ethics, and eight as proposals for the institution. They pointed out the need for a flexible evaluation to discern the differences between academic disciplines. Likewise, they stress the need to further cooperation between researchers and the social and industry sector to counteract the Mexican government's current scientific investment reduction. Finally, they underline the importance of university spaces for disseminating and divulging research results and products.

Keywords: *Higher education, Public higher education, Relevance of research, Qualitative Research, Social impact*

INTRODUCTION

This paper presents the qualitative results from a consultation conducted with academic researchers to determine the appropriate indicators for evaluating research projects' relevance and social impact at the Autonomous University of Baja California (UABC). This report focuses mainly on the conclusions gathered around the two categories mentioned above as of the experience of UABC researchers in a series of focus groups conducted during the latter part of 2020.

The general goal of this qualitative study was to identify the perception members of the community held about researchers working for the UABC regarding the most appropriate indicators for evaluating the relevance and the impact of research conducted at this institution. In addition, as specific goals, we sought to analyze the meanings of relevance and impact from the standpoint of researchers and, as well as distinguishing differences in these meanings between different fields of knowledge.

Qualitative research is a series of procedures with results that differ from those obtained through statistical processes or other quantification devices (Strauss y Corbin, 2014). From a traditional perspective, qualitative research presumes the need to discover meanings and emphatically grasp human behavior's motivations and attitudes (Rosenthal, 2016).

In contexts where work with people is conducted, systematizing results is difficult since it entails acknowledging the possible consequences. For this reason, sensitivity and empathy are necessary. When the qualitative perspective incorporates into any given study by considering its potential to explore and explain a phenomenon while acknowledging its openness and resilience, this implies engaging in work about gathering additional information as novel ideas emerge during the process (Darwin-Holmes, 2020). In this sense, this work explores and identifies various standpoints, experiences, and proposals set forth by UABC researchers around the impact and relevance of research and what they see as the most appropriate way to evaluate them.

This focus on the social relevance and impact of research is particularly pertinent in the context of STEM (Science, Technology, Engineering, and Mathematics) education, where research is expected not only to generate new knowledge but also to offer tangible solutions to societal challenges. The principles of STEM education emphasize the application of scientific inquiry, technological innovation, and problem-solving to real-world contexts. Therefore, evaluating the relevance and impact of research from a qualitative perspective, especially as it relates to community needs, sustainability, and interdisciplinary collaboration—is essential to ensuring that STEM research aligns with broader educational and social objectives. Understanding how researchers perceive and define relevance and impact can provide valuable insights into how STEM-related knowledge is transferred, applied, and evaluated within academic and community settings.

Research Objectives:

Given the growing emphasis on the societal value of academic research, particularly within public universities, understanding how researchers conceptualize and assess the relevance and impact of their work has become increasingly important. At the Autonomous University of Baja California (UABC), these reflections are essential in aligning research initiatives with the institution's commitment to social responsibility and community development. This study aims to explore academic researchers' perspectives on how to evaluate the societal contributions of their projects. In light of this purpose, the following research questions guide the inquiry:

1. How do academic researchers perceive and define the concept of social relevance in scientific research, particularly in terms of addressing social problems and meeting basic human needs within complex interdisciplinary contexts?

2. In what ways do researchers conceptualize and evaluate the social impact of scientific research, especially regarding its direct and indirect effects on individual and societal well-being across various fields of knowledge?

RESEARCH METHOD

Study Design

For purposes of the analysis and the operationalization of concepts, the *Questionnaire for the Evaluation of the Relevance and Social Impact* (CEPIS, in Spanish) was a reference; this is a measuring instrument previously constructed by this work team, whose purpose is that of providing information on the status held by the relevance and impact of research conducted at higher education institutions. This instrument, in its two dimensions, is itemized in the following indicators as shown in Table 1.

93

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

Table 1. Indicators of the Questionnaire for Evaluating the Relevance and Social Impact (CEPIS).

Dimension	Subdimension	Indicadors
Social Relevance	Adjustment of institutions to society.	Dialogue between the University and Society
		Linkage with problems of society.
		Respect and sensitivity for cultures and the environment.
		Attention to needs, demands, and problems of society.
		Innovation in the territory within a social-regional context.
		Foster interdisciplinary research.
	Participation with the social and political players.	The link between the university, governments, productive sectors, and think tanks or research centers.
		Comprehensive development of relationships between the university and the public, private, and social sectors.
		Relationship with various social sectors to determine the problem-solving guidelines.
Social Impact.	The accomplishment of social improvements.	The accomplishment of research goals leads to social welfare and quality of life.
		Changes induced by projects sustained throughout time.
		Participation with the communities with which research is carried out.
	Achievement of scientific goals.	Share scientific learning resulting from research projects within the institution and society.
		Procurement of the funding benefits and scholarships to generate research.
		Researcher training, thesis or dissertation directors, or terminal project work.
		Intellectual production: book count and papers published in specialized magazines and patents.
		Training of Human Resources in Postgraduate Studies (Masters and Ph.D.).

Source: González, et al. 2020.

Based on the 17 indicators cited above, categories and codes were determined to analyze the qualitative work proposal contents (see Table 2). The *categorization* process entails splitting or fragmenting the contents of the transcriptions into theme units that intend to expound the objectives of the research. Once the research team determines the categories, elements alluding to the minor divisions of the same topic or theme called *codes* are likewise generated. These codes are the textual expressions that concentrate on the part of the discourse.

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

Table 2. Categories and Codes for Social Relevance and Impact for the Analysis of Contents.

Categories	Analysis Units	Codes
Social Relevance	Adjustment of institutions to society.	Research in tune with the needs of the context (local, regional, national, international). Research in linkage and innovation relationships (public and private sector, and the civil society).
	Active participation with the social and political players.	Horizontality in linkage relationships. Proposal of indicators to evaluate the relevance and impact of research.
Impact	Achievement of social improvements.	Visible and measurable social changes. Visible and measurable progress regarding the discipline. Dissemination by endorsed media.
	Achievement of scientific goals.	Scientific training in Higher Education. Feedback from society to the research.

Source: Personal contribution.

A series of generating questions were posed to inquire into each category and about them as noted in Table 3. Their purpose was to act as a thematic guide. Barbour (2018) describes the thematic guides as a series of generally brief questions which act as a prompt to give way to a discussion.

Table 3. Generating Questions for the Focus Groups.

Relevance	Impact
What criteria define social relevance in the research you conduct within your area?	What criteria define the social impact of the research conducted within your study area?
How do public, private, or social sector players participate in the design of your work protocol (problem statement, objectives, instruments)?	How can the UABC researchers ensure that the research results contribute to solving problems and attending to the needs of social groups?
How can academic research commit to social groups that will eventually benefit from the study, whether directly or indirectly?	What criteria would you consider relevant for evaluating research projects without immediate or direct social impact?
How can we ensure that relevance is fulfilled?	How can we ensure that social impact is fulfilled?
Which would you consider to be such indicators?	Which could be those indicators?

Source: Personal contribution.

95

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

Focus Groups

The methodological technique to gather data was using generating focus groups. A focus group consists of a collective research interview whose objective is to obtain detailed and complex information on a specific topic or theme due to the interaction of the various participants. Such exchange among the group members fosters discussion and prompts reflection by listening to the testimonies of the interlocutors (Jung, 2019). Furthermore, by sharing opinions and experiences on a particular topic, the participants may offer common or opposing perspectives to obtain thicker, richer, and more complex information. In Figure 1, we may identify the different phases in organizing a focus group, according to Kinalski et al. (2017).

To gather information, we organized the participants into six focus groups. Each focus group comprised academic personnel (women and men) ascribed to different Faculties and Institutes of the UABC. This distribution was designed based on the areas of knowledge proposed by the Mexican National Council of Science and Technology (CONACYT) before 2020. So, in this sense, the group distribution was as follows[1]:

- Group 1. This one encompassed the areas of Physics, Mathematics, Earth Sciences, Biology, and Chemistry.
- Group 2. *Medical and Health Sciences.*
- Group 3. *Humanities and Behavioral Sciences.*
- Group 4. *Social Sciences.*
- Group 5. *Biotechnology and Agricultural and Livestock Sciences.*
- Group 6. *Engineering Programs.*

Participants

To select the participants, we established seven criteria which seek to respond to the level of enablement, the area of knowledge, gender equality, seniority at the institution, consolidation of the academic body, the academic unit of belonging, and the University campus statewide:

1. The participants would have to belong to the Mexican National Researcher System (SNI, in Spanish), and we strove to achieve an equal distribution by level: Candidates, Level 1, Level 2, and Level 3.
2. Area of knowledge: We considered the seven areas established by the CONACYT in 2020.
3. Gender: We sought equal participation of male and female researchers.
4. Seniority at the UABC: Representing newly hired researchers and those with the greatest seniority in the institution.
5. Belonging and level of consolidation in Academic Bodies.
6. Academic assignment at the UABC.
7. University Campus.

Now then, to extend the invitation to male and female participants, we requested the support of the General Coordination of Research and Post Graduate Studies of the UABC (CGIP, in Spanish), and by resorting to the institutional databases, we were able to identify the researchers by academic unit and campus. During the second phase, we submitted an invitation to each researcher on behalf of the CGIP, covering the seven established criteria cited above. The researchers who agreed to participate in the focus groups, whether male or female, were briefed on the topics to be addressed while in the groups

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[1] In the case of Group 1, we decided to include two areas of knowledge therein, given the number of UABC researchers associated with it.

and were provided with an ethics protocol, wherein the details of the guidelines and procedures to be taken into account for purposes of protecting their personal information, and the safeguarding of the information gathered from the groups, were fully explained and detailed. Likewise, each participant signed an informed consent letter to formalize the procedure.

The total number of researchers who participated was 39; 21 women and 18 men. By SNI level: 10 candidates, 18 Level I, 10 Level II, and 1 Level III, as shown in Table 4.

Table 4. *Distribution by Gender and SIN Level of the Participants.*

Gender	Level C	Level I	Level II	Level III
Female	6	10	5	
Male	4	8	5	1
	10	18	10	1

Research Team

The research team consisted of two female researchers and two male researchers, inserted in different combinations of pairs. Hence, each researcher was able to interact with two separate focus groups. The organization was based on the criterion established by Rosaline Barbour (2018), who recommends working in pairs as a strategy to make the most of the skills of the various members of the team. The primary purpose was to involve the team in multiple focus groups, giving us a comprehensive view of the diversity of the areas of knowledge.

The research team's role consists of actively participating in the group. Estrada-Jaramillo et al. (2022) recommends that the researcher pairs act as *moderators* and *observers.* These two players interact with the group but refrain from having any say on the opinions therein; it is the opposite. Instead, they catalyze participation to bolster dialogue. The moderators introduce, stress, clarify and facilitate discussion and exchange, thus avoiding having any participant monopolize the debate. For their part, the person acting as the observer reinforces the discourse and records alternate or complementary information that recording methods may not record.

Procedure

The virtual development of focus groups was achieved using the Google Meet platform, given the contingency stemming from the COVID-19 pandemic, which had a manifold impact on the unfolding of university activities during the more significant part of the year 2020. The remote-style dynamic was based on virtual focus group logistics. Such virtual focus groups are characterized by the synchronistic implementation of the procedures related to focus groups, with the simultaneous participation in real-time both of participants, as well as of researchers, in debate spaces, and by resorting to the use of software that facilities on-line interaction (Haliday et al., 2021).

The focus group sessions were recorded with the authorization of both female and male researchers. Such recordings were transcribed in their entirety for subsequent analysis. Facilitating questions were designed for the topics. They consisted of open-ended questions created to trigger conversation and reflection, thus allowing us to identify the opinions and experiences of the UABC academic community about the relevance and impact of research conducted in this institution. The average duration of each session was of about two hours.

97

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

Once the sessions had concluded, we established the data storage system. Such activity should be systematically and coherently carried out to retrieve the information. In this stage, the work team found an identification or nominating system for female and male participants, which had a double purpose: systematizing and identifying the interventions and safeguarding the anonymity of female and male participants.

Information Analysis

Although qualitative analysis does not demand specific software, "Computer-Assisted Qualitative Data Analysis Software," known as CAQDAS, has become widespread in recent years. This CAQDAS has focused chiefly on managing data as diverse as those generated from interviews, field journals, documents, observation records, or focus groups (Rioufreyt, 2019).

Various models detail the process based on categories, from the data gathering stage to the final reports to develop an analysis based on categories. The main distribution is similar in structure traditionally associated with "cut (or copy) and paste." This CAQDAS technology is characterized by its time-saving features during particular moments of information processing, with no detriment to its goals or objectives.

Given the diversity of expertise in using CAQDAS amongst the research team members, we opted for the benefit of ATLAS. Ti, MAXQDA, and RQDA, depending on personal preferences. For information processing purposes, the research team prepared a set of coding matrix (Kuckartz, 2019). The encoded segments of the transcriptions were included in such matrix to conduct the content analysis. We assumed that such content analysis is the methodological instrument applied to discursive scenarios. The main feature of this technique is the deductive hermeneutical exercise (Farinola, 2023).

LITERATURE REVIEW

Impact of Research

This paper assumes that, in broad terms, the impact brought about by research is defined as the outcomes stemming from research work to wit, the product of a series of metrics and indicators that have a bearing on such research work and its effects. Evaluating the impact of research entails determining what was accomplished and by what means. However, such impact likewise refers to the impact emerging from applying knowledge. By this token, we may speak about a social impact when changes in the population are being evaluated, whereby such changes result from the research. In other words, the impact brought about by a social project or program is quantitatively defined by a total or partial resolution of the problem, as referred to by the population, resulting from delivering a series of products evidencing such change (Barnett, et al. 2020).

According to Stefani, et al. (2020), there needs to be concrete information on the actual impact of scientific research. It is difficult to objectively undertake its evaluation because of the belief that it implies evaluating the novelty of the research topic rather than the contribution yielded by the segments of knowledge gained as a result. Even when it is common to have evaluations done as a function of the results, as of the number of publications and quotes, it shall only evolve into a comprehensive strategy when research is viewed as a change-fostering asset.

Relevance of Research

This qualitative probe stems from the understanding that social relevance refers to actions carried out within the research exercise geared toward collectivity. Hence, socially relevant research is sensitive to the global scope's social, economic, and political conditions and their impact on a university's locality. Socially relevant research work gives way to actions geared towards the understanding and resolving problems experienced by the local community and the innovation of products, services, and strategies designed to improve such community's material and non-material conditions (Chen, et al., 2020). It likewise poses that scientific research, from any given area of knowledge, should respond to short-, mid-, and long-term social demands, bearing in mind the capabilities and possibilities of a higher education institution to engage in research projects (Gumport, 2019). Finally, it demands a rapprochement between society, the productive sector, and academia, exploring new development perspectives by considering the voice of all the beneficiaries and setting the foundations for collaboration ties between such social actors in an egalitarian and sustained manner throughout time. In broad terms, three central components link to this relevance: The author or whoever conducts the research work; the reply or the contribution as an outcome of the research; and the need it is purported to attend to (Calvard et al., 2023).

Qualitative methodology to evaluate the relevance and impact of research

Typically, when a research problem approaches from the qualitative perspective, reference is made to a non-mathematical approach, which is more characteristically an interpretation aimed at uncovering the relationships existing between the information gathered, seeking a way to theoretically present an explanation to such details (Strauss & Corbin, 2014). By separating it from quantitative analysis, qualitative research was defined as only for a short time. Such a perspective, which prevailed for many years, has now been overcome, and it is thus necessary to focus on describing its features (Flick, 2018). Quantitative research seeks to understand phenomena parting from an inquiry process from the standpoint of the participants and their relationship with their setting (Hovey et al., 2022). Understanding individual and collective discursiveness(es) in contexts where spontaneousness is prevalent is sought. In this manner, beliefs and imaginaries associated with the social dynamic emerge (James, 2019).

In this sense, the design of a study with a qualitative nature should feature a planning process that would allow for a decision-making process. Firstly, we should consider that the primary material shall be the text and the presumption that all knowledge is socially constructed; thus, the relevance of salvaging participants' perspectives as methods and techniques (Flick, 2018). Within the methodological possibilities, it is essential to consider the narrative role played by the participants. Therefore, the research team needs to emphasize understanding the processes developed in the narratives, the characteristics of the parts, and the social dynamics of the contexts studied. To a great extent, the wealth of the gathered information depends on the environment's climate and naturalness and how the participants perceive it as an experience reproducing the context where it is developed. Furthermore, the participant's subjective experience is a sample of the construction of their social world on how they conceive reality in its diversity (Mills et al., 2020).

99

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

RESULTS

The report results have been divided into two thematic blocks associated with the perception and experience of the participants on the topics of relevance and impact of research. Each block is then divided according to the description of the indicators, along with the preliminary information gathered from the participants and researchers, and framed with integrating notes generated from the discourse.

Lastly, recommendations on assessing the impact and relevance that the academic peers narrow down as indicators for their possible evaluation are drawn from the research team's perspective. As part of the dynamic of the groups themselves, a series of suggestions to the institution is likewise generated from the standpoint of both female and male researchers.

Perception of the Players Associated with the Relevance

Research in tune with the needs of the context (local, regional, national, and international).

The implications of the relevance above in work carried out by female and male researchers sensitize them to regional, national, and international problems. During the participation in the various focus groups, some criteria to define and pinpoint such needs began to take shape. Particularly in the Humanities and Behavioral Sciences, as was in the case of Social Sciences, discussion frequently addressed the reference to the Sustainable Development Goals (SDG) as guiding principles of the 2030 UN Agenda. However, the connection to the SDG entails not only identifying international priorities but, likewise, the search for external funding. However, other alternate proposals emerged, for instance, the guidelines set out by the World Health Organization (WHO) or by the CONACYT above; there were even those who in the Linkage Committees perceived an opportunity to define a plan on the relevance of research on responding to the needs of various sectors.

> *"For example, we often have certain criteria regarding an internal summons for a project, always based on the UN's 17 items, and many times, I fail to see where I can land my projects when I see those 17 items. However, the local need of society demands what I am working on from me, and at times I say to myself: "How can we frame the criteria to the needs of our work?" FG (Focus Group) 6.*

> *"… Besides, from my perspective, there are certain impositions on what is relevant and what is not in the health sector, and to be honest, nobody has ever told me what is and what is not relevant; I see, and I seek. For instance, in the WHO guidelines, we know that Mexico is facing a severe problem; in fact, Mexico is currently number one in child and adult obesity, diabetes-related problems, and metabolic issues, and that, from my perspective, is highly relevant for all of us who work in the health sector. We should address that in our research" FG1.*

> *"It seems to me that, seen from that standpoint, CONACYT's plan is relatively straightforward, unlike other periods, where initiatives or projects were around, but there was no clear public-scientific policy on the most pressing issues for the country …. So, in this sense, CONACYT has proposed clear core guidelines on where the emphasis has to be placed regarding scientific research in the country. FG4.*

> *"… these sets of problems are very well defined, even by CONACYT, and in the various areas or fields of knowledge, we already know the problems we face as a country are; it is of the utmost priority and urgency to attend to them. That is why I feel that the first thing would be for a problem to be a national priority, and in our case, likewise of a state priority, since we already have some sets of problems already defined by regions (in Mexico)." FG3.*

> *"… in other States, in other places, the society, companies, the industrial sector … they all approach universities, because they know they are problem-solvers, so, therein we are lacking this slight*

change of mind frame in the sense of beginning to apply all that knowledge that throughout all these years has been generated at the laboratories of the UABC." FG5.

In the case of other disciplines, such as Engineering Programs, as well as Medical and Health Sciences, research is typically carried out as of emerging needs, as was the case with the COVID-19 pandemic, where institutional resources and efforts were made available to support the requirements of the public health system. However, for a segment of the University teaching community, it is clear that access to funding and resources for scientific endeavors is becoming increasingly limited. In the linkage processes with external players, we can glance at possibilities of managing equipment or recourses for research purposes. Linkage is a feasible strategy but is at once unknown at the level of the process researchers must be savvy in.

"We had to do some volunteering work. We installed the COVID-19 unit to offer Covid diagnostics at the Faculty of Medicine; we had to make a huge effort for this to happen … I feel that volunteering work is that solid gold that we have to make the most of in front of our students, since accessing funding and resources is quite difficult. In Mexico, I'm not engaged in doing research work in and of itself since in Mexico, procuring funding and resources is a waste of time. That is why I do my research in the United States and engage in volunteer work here in Mexico." FG2.

"In my particular case, we did linkage work specifically with the Lions Club using a program. And actually, Lions Club helped us out with materials and equipment so we could carry out these types of interventions. This, in turn, gave way to an agreement entered into obviously with the faculty (of Medicine) and, aside from providing us with some reagents, they also supported us with some specialists in certain areas so that our medical coverage would be much broader." FG2.

"But we've lacked this part of linkage work. So then, linkage plays an essential role for us to stay in touch with the social-economic groups or players who are stating that they are experiencing problems. We may help determine where those problems are so we may proceed to design research projects. We may work with organisms, chambers, associations, and so on. All the society players, or groups already organized or working together, may give way to the concrete research endeavor." GF4.

Research done at universities has led to an uneven rapprochement of social reality. Opinions set forth by social players and their needs have yet to be reflected in the structure of research projects. Self-perception regarding academia and society still is a natural, tangible phenomenon. Furthermore, even when it does involve social needs, research still needs to be connected to communities since it is common for standard programs' beneficiaries to have zero knowledge of the results stemming from the research they participated in. However, we need to add the economic factor as a substantial element to procure funds and resources and afford continuity to the projects. Often, the paralyzation of research is due to a need for more investment and awareness amongst academic communities on the feasibility of procuring funds by alternate channels other than the university itself. The third factor having a bearing on the relevance of projects is linked to the institutional timelines within which it is required to generate evidence of research results.

"From my perspective, I feel that the UABC has been excessively academic; too centered on basic or applied research, but with no grounding with the people; thus, the greatest challenge, or the means to verify research … would have to be geared towards gathering opinions expressed by people around the UABC … I am referring to the population as a whole, the small communities ("ejidos"), the villages, our sector; the idea is to gather as much as we can on how pervasive the UABC is with regards to all of them … I just want to add that we have been terrible at this part, in the sense that we are being too "academic" … working inside our cubicles, surrounded by walls, with an ever-present A/C unit … but we're lacking an actual transcendence with the productive sectors. I still see that; it's ingrained in the UABC educational model." GF5.

"And so, I feel we have to think big, think outside the box, and not turn back. We should begin with the local, with what's particular to each academic unit. Still, we should at once think about the

101

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

notion of a research intervention that should yields results, even with the constraints entailed by each particular situation, that's a given. But the idea is that we should strive to achieve results that the community will acknowledge as such … we have to make that happen in most cases …" FG2.

"… right now, we're struggling with the funding issue … we've been without funds for almost three years now, and we see no sign that funds are coming our way with this federal government that boasts so much about this … in the end, it is not putting all its economic marbles on research. So, we are now seeing a very important gap, a mismatch, since, as many of you already know, quite a few of the research centers are practically at a halt, if not because of the pandemic, it is due to a lack of funds to operate them. And this is happening in our country, to the development of research projects; and the society is the one ending up as the most affected." FG6.

"We have to adapt to this situation, and part of the criteria may very well be what's currently being one: linkage with another national sector, and I should say that both are equally valuable; obviously, the impact would be much greater if this was projected to an international level." FG2.

"… In my experience, I have indeed felt such constraint on deadlines, mainly because when you submit a project to do research, and such project is funded, we have to meet certain goals or deadlines, right? One has to come up with a product. But it turns out that one, as a researcher … and this is something that has happened to me, I don't know about you, colleagues … we're sometimes more concerned about submitting our paper, dissertation, or chapter, and tend to miss the details entailed by the processes, most of all the community processes." FG3.

Besides, female and male participants talked about stress brought about by the time required to look for funding sources. This contrasts sharply with the limited time to conclude a research project and generate results. Moreover, likewise, to form trust and cooperation links with the various social sectors, we need time, which is not foreseen in the requirements asked for in the summons of the research projects. Managing these processes complicates setting priorities on community processes and dynamics regarding the demands of assessing organisms that provide funding for research purposes.

"we've become quite resourceful to be able to move on, to procure funding … right? We already know that procuring funding is difficult enough, to the extent that we sometimes struggle with each other in summons, external or internal, and I feel that the last time we got evaluated, we were unlucky or unfortunate enough that, since in the National Researcher System (SNI) they decided to raise the bar a notch or two, to be able to remain in the SNI, we need to submit papers … at least that's our case in the biomedical, chemical, and health science … we're being asked to submit papers …. more than 5 of them. But, with the resources we have at the university, it's quite difficult to keep up with such pace …" FG1.

"So then, I feel we all have this obligation of accomplishing goals, of meeting deadlines, but they should be somewhat more flexible … more keen on what we are working on, not at the pace that I would like, nor at the speed to achieve products, but on being on the pathway to achieve such products … and one of the most important problems we face is indeed [the lack of] resources." FG2.

"For me the participation of stakeholders or beneficiaries is quite important, since in the end the service, product, or whatever is gained with the research is to be geared towards improving the quality of life of the vulnerable groups amongst the beneficiaries or stakeholders, etc." FG3.

Research in linkage and innovation relationships

Social relevance demands that research be conducted in collaboration with various sectors. In the different groups, we observed discrepancies between how we may build with rapprochement with the other sectors and the challenges this implies. There are areas of knowledge, particularly the Engineering programs, which bear a productive relationship with various sectors of society. This relationship has been consolidated with entities such as the Linkage Committees. However, there are yet other sectors that talk about hindrances and hardships that have to be faced when trying to create this type of

102

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

relationship, given that, from the standpoint of the participants, there is little credibility about collaborating with the university. It is important to stress that such a point of view emerges from the experiences of researchers in the agricultural and livestock areas as local growers and producers.

"... and therein we may together find a convergence amongst them .... In the sense that we have other projects we've worked on with different sectors, whether with NGOs, the production and industrial sectors, and then there's the government ... sitting at the table with all of them is not an easy task, much less to find points of agreement ... but it is possible, nonetheless." FG1.

"... one of the strategies that have worked quite well in creating linkages with the private sector, for instance, is collaboration through projects, or through services for solving problems, evaluating problems, assessing or characterizing samples, and so on. So, this was a pleasant experience for me since of the research activities, projects, or even techniques we develop daily, quite of few of many ends up having many applications for numerous private sectors." FG2

"... I feel we are lacking precisely that ... we missed involving the social sector we were supposed to favor when designing the research protocol if they were the ones who asked for our help to improve certain didactic matters, but we only got that far ... we defined the objectives, scopes, and other items in the research group, and afterward we presented the results to the target social sector, but that was it ... I think this is something we should reflect on .... We fell short on becoming increasingly more in the sense of the design of the social sector." FG3.

"We have been lacking that part of the linkage process. So then, linkage plays a vital role in remaining in touch with the groups or the social-economic agents. They are stating they are facing problems, and we may aid in determining where those problems are so we may proceed with the design of pertinent research projects. We may work with organisms, chambers, associations, etc. All these organisms are part of society, fully organized at times, or working together, which may give way to concrete research endeavors. Exercises have been conducted in which you become an asset for such institutions, organisms, or offices, from which concrete research demands may result." FG4.

"... with all due respect, I disagree with the statement that research linkage should be conducted as separate processes, right? I feel it is precisely in such a moment when we have the golden opportunity to put both together. Allow me to explain myself: for instance, basic research may have some branch that lands on the surrounding population right here, or some application, meaning that I may have a basic research project at my lab, duly equipped with colleagues [inaudible] ... academically highly empowered, and carry out my research which would allow me to come up with publications of an international nature, but some stream, or some professor, or collaborators of the academic body could be well-grounded... we would be talking about a straightforward technology, or by-product thereof, with the social sector; then research, however keen or applied it may be, is going to bear an application, and could have one; actually, it seems to me that the intent would be focused on the federal institution or the institutional nature of the UABC, in the sense that research and the linkage process may merge into one sole component." FG5.

"...one frequently used strategy refers to the linkage boards. In this case, we, at the Faculty of Engineering, have conducted regular meetings every time, inviting players of a given group of interest. In this case, such a group of interest may include people working at private companies, stays, associations, or chambers of a certain sector of society that in one way or another is part of a benefit springing from the endeavors the university engages in." FG6.

The subject underlying the discrepancies in how the rapprochements, as mentioned earlier, with the various sectors are carried out. The remarks often spun around the notion that the social sector fails to approach society and that the university is not sought out as an asset. Of course, this is not a shared experience, but such remarks suggest that the proactive exercise to create linkage bonds with actors foreign to the university is a rare practice. On top of that, some participants spoke about red-tape related difficulties when establishing linkage projects, which eventually became another hindrance to the

103

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

detriment of collaboration of social sectors and academia concerning research endeavors.

"… so here we had two quite singular questions, linkage and research, and the university created a linkage department many years ago …. I worked there … we were a sort of letter of introduction of the university in the face of the social and private sectors; we went around knocking on doors saying: "This is a portfolio of affairs, and we can do this or that … " … and there came the time when people no longer wanted anything to do with linkages with the UABC, since administrative matters were … well, to put it bluntly, difficult to work with … it was s horrendous situation, and many flat out withdrew from the linkage matter … so, these direct research liaisons were particularly left to the academic unit and the researchers…" FG5.

"I feel that … well, we know that sometimes, if the project is relevant, and it is the administrative matters keeping us from being able to successfully deliver a project, and, for instance, if we request funding, well, the time when we will be able to have such funding readily available to us for purposes of exercising it, may become a restriction … and all that time available to us to be able to fulfill our goals simply runs up". FG6.

"It is like a finish line, or a goal, for all of us working in the Social Psychology area, and for those of us who aspire to do work highly focused on a community, which entails a process that requires time … And, in my experience, I have actually seen this time constraint, especially when one submits a project to do research, and such project is to be funded … because of this, we have goals and deadlines to meet, right? We have products to deliver, and we suddenly see that as researchers, we become more concerned about submitting our paper, dissertation, or chapter, and tend to miss the details entailed by the processes, most of all the community processes, which need time and patience. These are processes that need to mature piecemeal so that people, or the beneficiaries may become involved, and very actively so, for that matter, not just a simulation of an involvement, but rather in what it really means to get involved. That would be my answer … that would be what we would aspire to … In my case, I haven't been able to accomplish this, and I feel quite limited (as a female researcher) because of the submission deadlines regarding the products a research project demands from us." FG3.

The differentiated features of the various knowledge areas render some more related to the productive sector and others to the public sector and civil society. By this token, the needs of the sectors and the way links are established bear very distinct nuances, which, according to the participants, should be crucially taken into account when evaluating the linkage and innovation in research endeavors of the UABC.

"… Well, it is important that we use other means of linkage, since we are aware that federal, CONACYT, external, or international summons are asking for linkages with government, the industry, etc. So, yes, we do need to open our spectrum of options a bit more, by the fact that there are other funding sources that may be sound allies given the lack of resources, right? … For instance, such lack of resources may be harnessed so that one company or institution may partake with funding within the summons of projects led by the university…" FG1.

"As I was listening right now, I feel that to conduct research projects, we definitely need to earn good publication results and place ourselves at a solid peer-recognized echelon but, unfortunately in order to accomplish that, we need quite large sums of money. So then, a good strategy to get the money, to land research projects would definitely be working with the private sector through the various modalities the university allows us to resort to. By doing so, we've been able to purchase reagents and any materials we may have a shortage of at any given moment, and so on. In other cases, we've participated with some other smaller companies, at times under the scheme of 'we'll help you with the analyses you need, but help us out with these materials.'" FG2.

"And well, in our case, what can we do about it? This is relatively simple, given the fact that we work with academic authorities of certain educational campuses, and they are generally more than willing to peer-review works … it's just a matter of scheduling such work, and the educational sector would be more than willing to collaborate with the UABC in any given proposals." FG3.

"Something that has boxed us in is the fact the you may obtain academic products out of this project or of this proposal that you're identifying, and why is that? Well, this because all of us want to have productivity for Prodep, for the SIN. Actually, the SNI itself is also asking us for linkage-related items that were not previously taken into consideration, but that nowadays play an important role, given that linkage may also give way to other types of liaisons, other types of projects ..." FG4.

"...I took it upon myself to conduct a study of research projects going back 5 years, over at the Institute of Agricultural and Livestock Sciences, and it features at least one chart that I saved, which seemed to me to be quite revealing of the lack of linkages with the social sector. I feel the UABC has been over-academic ... too centered on applied or basic research, but failing to landing projects with the people; thus, the main challenge, or to put it in other words, the most heartbreakingly landed means would have to target the gathering of opinions expressed by the people around the UABC ... and when I say 'people', I am referring to the population, the 'ejidos', the villages, our sector ... the idea is to gather as much as we can on how pervasive the UABC is with regards to all of them ... and in a nutshell, I just want to point out that I feel we've fallen terribly short on these endeavors". FG5.

"it's not just a linkage with the governments, NGO's, or the various types of partnerships or companies, but rather what the people ask to do. For instance, here it's quite common for people to show up and request some piece of advice, since they found some mineral vein near San Felipe in the desert, o they want us to assess better irrigation systems, or if they have a piping problem. These are problems to need to be solved, but in the end, we may focus the research by entertaining the needs of the society as such, and nobody may express such needs better than the society itself." FG6.

Additionally, the participants identify another stressing factor, from the demands of complying with the academic productivity indicators set out by the university and the evaluating organisms, such as CONACYT and SEP (Ministry of Public Education). At the same time, at once continue to work at the pace of the dynamics of sectors outside the university. The discrepancies in the deadlines and what is needed as performance evidence render the processes of linkages in research increasingly tricky.

"What's also important is the way we determine the validity of these projects, or the way we should evaluate them. In recent years, when a change at the directorship level of the CONACYT took hold, the social part took over, and now, practically all projects must mandatorily feature a social component; it is indeed important to include this social part. However, I believe that there many projects out there, many lines of research, within which this social dimension may not be mandatorily included. So then, during the last summons, also of the UABC, this is included as an important factor, or even a determining factor, to be able to partake in the bid for the project." FG1.

"I was debating with my colleagues on how unfortunate we are as researchers because our hands are tied, and we cannot do anything. For instance, this border application CONACYT came up with just last year. The project went through but has not been assessed; there is no money, we cannot do anything about it, our hands are tied, as I said, and there many social problems out there that need to be resolved, but with what? For that, we need to change strategies. FG2.

Our projects continue to see the light of the academic bodies, so our degree of relevance and impact will be quite constrained. That is the other issue, the topic of cross-disciplinarity; it seems that the academic bodies will need to solve it. Actually, very few academic bodies at the university, and even nationwide, work under this cross-disciplinary scheme." FG4.

Horizontality in the linkage relationships

Social relevance responds to establishing links between society and academia and alludes to the quality of such relationships. Thus, social relevance entails horizontal and collaborative relationships, where the voice of the social players has a say on the pathways of investigative work. Additionally, it implies an implicit observance of the ethical aspects of research work.

105

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

It is worthwhile to point out that, except for the Engineering Institute, which, through the Linkage Committee, features a mechanism to foster dialogue amongst the various actors. However, there are no generalized practices to achieve horizontality in the different areas of knowledge. Also, both the female and male participants should have mentioned putting into practice protocols aimed at establishing ethical guidelines which may regulate the linkage relationships.

> *"The linkage committee right here at the Institute has people who not only belong to the industrial sectors, but also people who belong to the social sector. When the linkage committee holds meetings, they talk, for instance, about what projects are ongoing right now; lately, a lot has been said on the dependence research projects have on the income earned as a result of work carried out for different public and private sectors, mostly noticeably, the private sector, which contracts the projects and services and which give life to several of the projects we presently have going here at the Institute."* FG6.

> *"Let us start with everything we do: what we are currently resorting to public resources, and not just CONACYT, but what we do here at the university. We are using public resources because our wages come from there, and there should be a norm or criterion of complete transparency in this sense. Whenever somebody has access to a project we are proposing at any given moment, we will certainly be more careful about how we propose it. When everybody sees that a database is available at the university and say, "ok, let us take a look at this o that researcher ... let us see what products or results this researcher is reporting", "let us see the final results of the research". And yes, that's quite a different story ... we turn in reports, but, who checks them out? Nobody! What's more, who is the report delivered to ... we end up turning just the final page of it! We would have to turn in a report wherein we state our project, the statement, the method we are using, the results, and of course, the conclusions. It would be a document that puts all of the above in its proper place. This is transparency. And that has to be made available in a data base where the public may see what is being done with public monies. We should submit ourselves to public scrutiny. And there's another criterion we should consider: sharing what we did research on ... it's not ours, it belongs to the public ... since we got paid for doing our research with public resources."* FG4.

In the areas of knowledge with primordial relationships with the productive sector, such relationships appear more patronizing than anything else. In contrast, in areas of knowledge where work is conducted mainly with the public sector and civil society, relationships tend towards welfare.

> *"I'm aware that we have premises, like in the case of Odontology, where we have installations that are the oldest there are the faculty. Then, I feel the best way to push for this to grow, since the impact would be greater, and I feel it is already quite a lot, since there are lots of low-income people, and this will help the students and the overall population. So then, yes, we should look for a way for this impact to be much more far-reaching, to be higher, to help us out, since I really believe it would be something good if we help have a greater impact on society."* FG2.

In this sense, we need to understand the implications of a collaborative, horizontal cooperation relationship and how this may be translated into a hands-on research exercise. Moreover, it would be essential to consider the ethical aspects of research work, chiefly in applied sciences, and the necessary actions to explicitly formalize it in research works.

Perception of players associated with social impact

Visibility and measurement of social changes

Addressing the importance of basic sciences upon seeking to improve living conditions entails analyzing the investment processes undertaken to foster sciences, technologies, and innovation. That is

why the importance of basic sciences lies in their potential to intervene in various development contexts. To evaluate the social impact within the disciplines of basic sciences, we must institutionally ensure the capability that protocols may reflect solutions to problems and social needs in all those specific cases in which their inclusion may be considered. Unfortunately, the characteristics of research projects often compound follow-up associated with assessing the impacts thereof. In the case of basic sciences, where applied research is generated, such difficulty is rendered a recurrent phenomenon.

> *"It would be good for the UABC to help us out with this by implementing a support system or program for researchers that would engage in establishing this part of linkage between us researchers who focus on basic science, and researchers who focus on the social aspect; this way, the UABC could help us see throughout the university who we may participate with. The UABC may likewise help us out with the task of matching research work, thus allowing us to forge communication efforts with such researchers, or in such academic field, and be able to begin out work. I believe this would of great help for both parties". FG1.*

> *"So, as I saw this type of results, I woke up and began to think things like … "How can I make what I do in the field of basic science applicable daily?" And it is clear to me that without basic science, I will not have an impact on any sector since it would be like walking blindfolded, but …. If we fail to look for ways to apply our work, it's like having no goals set for ourselves … like having no target to which we may focus our work …" FG2.*

> *"So then, this is the approach: If it's macro, we see the structures, and if it's microsocial, we may focus, as I suggested, on the case studies and methods of application. And depending on the type of project, which also has a bearing on the levels of knowledge of the researcher, we would engage in exploring the research design to be selected; if it's about a simple study, or about more elaborate studies. Hence, it would be up to the experience of the researcher. That's why I mentioned that projects should be classified as basic, applied, or development science projects. On the basis of that, we may demand the appropriate knowledge level for each project." FG4.*

> *"…we have many research projects that are basic science, although they have no direct application in society, whether direct or short term; generally, this takes place at a long term. But out of the projects that may have this application, maybe many of them have a direct bearing on the production of fish, mollusks, crustaceans, along with the contribution of such projects in terms of production, physiology, just to name a couple. This may perhaps be measured by the impact on the State; many researchers already work with the State. And we may talk about how much technology and knowledge are actually contributing. Right now I do not know how we can directly measure these types of things, but I don't believe it will be something that may be carried out directly, or that there is an indicator to measure that." FG5.*

> *"… the university is a University of teaching, and the priority is to teach; we will also engage in conducting research, and in this sense, I feel that with time we will do more research, although this will not demand a huge stewardship capability. In fact, at present there is no CONACYT, there is no State funding; that's history now. Projects now come tagged to very, very social matters, and the more basic science, the more technologically oriented science is somewhat relegated, since many of the projects that one sees as feasible, well, they are not approved. I say this out of experience. Just in this latest evaluation that ended up in these emerging funds for COVID-19 related issues, there were excellent projects that were not approved, and we had them passed through us two or three times as reviewers. Bases were given both by reviewers and by proponents, but the projects were not carried through. So, this is yet a third constraint that lies "out there", and we as researchers have to turn our sights on how to be good stewards and be able to procure funding, because research does not come cheap …" FG6.*

Among the obstacles entailed in evaluating the social impact of research works, we may have the following: the duration and the possibility of generalization to other areas of knowledge. From the

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

participants' standpoint, it is necessary to establish follow-up processes or generate other research papers that may accommodate the initial project. In particular, the case studies may be incorporated from a practical standpoint to better visualize the impact of such research work. The problem-solving proposals may be an indicator, even when they may not necessarily become concrete due to the length of the project—the latter, especially when considering several projects that may hardly be adjusted to an annual evaluation. So, the challenge, therefore, lies in visualizing products that are an alternative to research, which may render the short or mid-term impact visible.

"in my particular case, I work in molecular ecology, so, it is about trying to answer ecological questions with molecular tools, and one may even lean a bit to both sides, in the sense that it may be about a very basic science in which there is not direct short-term application, or else, it may be something that's very, very applied. For instance, something we engage in that's very applied to the society is working with fishing coops is that normally we as researchers are the ones who ask the fishermen for support when we conduct research. In the end, they were the ones who ended up complaining and said to us: 'well, you are supposed to be here to help us out to achieve a better production, to preserve a fishing area, and I don't see the results, so this is being of no benefit for me at all'". FG1.

"An important criterion to study this impact is by observing things from the standpoint of engineering, which is sheer application, and I believe application is quite important, and to come up with a good application, I feel we should be able to better manage the basic science that lies behind such application … if we fail to apply our work, it's like walking around aimlessly, with no target in sight, so then, I believe that application is a very important criterion when based on a well-known, well established, and sound basic science." FG2.

"Many times we do not undertake projects that may reach the point of having this impact, which is through interventions. But, if we generate knowledge so that some other institution is able to generate those programs, well, I believe this may be part of the social impact that the evidence of the knowledge we are generating may be acquired as of partnerships or institutions, and subsequently they may also give way to their own programs or projects for the benefit of the society; aside from the fact that this knowledge may also be shared with students." FG3.

"To comment on the impact some faculty projects have had, mainly in the Masters Program, since this is professional, the work that students engage in is applied case studies, dependent on the place where they are, and entail an important impact. Likewise, there are research projects on migration, wherein researchers and students alike get involved with social groups, migrant groups, which in the end lead to programs benefitting them. With regard to dissemination of these results, books on case studies have been produced by graduate students, where one may see the direct application of the work they conduct at their corresponding institution." FG4.

"What I can say on social impact is that, first off, what we are lacking in the university is briefing the society. Meaning, we undertake our research projects, linkage projects, and we do a bunch of things, but we fail to inform the sector. We do rapprochements in terms of Medicine, Social Issues, Veterinarian, Productive, Agricultural, and we do it punctually. This means that we do it for the person who gave us the opportunity of establishing such connection, and that's that." FG5.

Some participations spin around research goals and their impossibility of solving problems. From this standpoint, science intends to lay out routes as on previously generated knowledge. So, the institutions and public policies are the ones who bear the burden of finding ways to apply such knowledge. For social change to be feasible, we must attend to all such problems that affect communities, and the attention provided must be as swift as possible. The social role of research lies in presenting evidence to those who make political decisions on the priority of social problems. For this to occur, it would be desirable to have the research protocols show the problems to be solved.

108

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

"We have the assumption that research has to solve problems. So then, we start off from the assumption that demands too much from research. It's something like when we tell students that their dissertation work is not going to solve anything. Actually, their dissertation is going to do research about a problem, it will analyze it, explain it, and will propose things. So we're seeing this that is demanding a solution from science. But science may propose … those of us who've had contact with the institutions know this. We turn the document over to the institution, we deliver the outcomes, and the political powers that be decide what to do with them." FG4.

"If you allow me, if one goes to the sectors with a fully open heart, and tell them: 'look, let's get to work. I'm not here for the money… I just want to help you … I have this set of actual skills that are going to help you solve this or that problem.' And it is about solving the true problems besetting us … we have the skills for that, and what we want is to actually solve the problem in terms of what we know, and this does not necessarily entail having the sectors know about it. To summarize, approaching people is a slow process, and we need funding and resources for that to happen. We begin to gain their trust little by little … the social, and productive sector begin to trusts us … we also begin to gain the trust of our overall setting." FG5.

"How was it possible that research delving on a problem that was not a problem could be approved?... So then, unless we are capable of fully justifying your problem, and you may cross it with other variables … I mean, what we need is to show that we are indeed having an effect, for instance, on the health of the population, … but I feel that any person with a common sense would have said: 'does this make any sense?' or 'Is the outcome going to be positive for a specific group, or is it going to affect all of us?' But this cannot be observed in the justification of the problem…" FG3.

"So, in this case, with regard to the social impact we are discussing, I feel that basically all the research protocols used by researchers firmly aim at providing a solution to any given problem; it may be about attending to a social need that may be big or small, but even with all of that, it still is a basic research work, and in the end, these projects will contribute to science and will bring about a huge impact." FG2.

The importance of generating empathetic processes in the scientific community gains relevance to be able to have access to the actual needs of communities. If we can establish epistemic bridges allowing us to link projects with the voices of communities attended to, we can generate concrete and pragmatic processes. Also, of paramount importance is understanding the complexity of social issues and their potential for transformation to avoid demand beyond what a project may accomplish under the generated conditions and not to develop simulated products for purposes justifying the projects.

"As was mentioned about the fishing communities or the native, migrant, agricultural, cattle-growing communities, it is not easy to reach out to them. I mean, we could go over to their communities … one could ask to speak with the leader therein, and it's not always that easy … we have to develop empathy … we need to know how to approach these people. It's not like saying: 'hey, I have this research project and I want to take your community as a sample'. We need to engage in some hard convincing work before request their approval; and there are experts in this field who are the actual people that work in the social element of research…" FG1.

"I'm going to give an example of a project that I found to be quite interesting, which was conducting here at the Institute. It was not a project of mine, rather of a coworker and his work team who engaged in evaluating renewable energies. So, basically, the project consisted in starting up a complete power plant by using these solar systems, along with everything entailed by this energy harnessing sector, and in the end, we were able to provide electrical power to a small village who did not have it before …" FG2.

"… and going into more pragmatic issues, it would be like a matter of coming up with some sort of questionnaire to go to communities to see which part of the project is being undertaken, whether to rescue the voices of the social sectors that were involved in the research, or for some other purpose. I find this to be complicated, but as soon as reality is put in motion, we begin to foster

transformations. The mere fact of being here in this Focus Group is already leading to the generation of ideas that may bring about change." FG3.

"Every action is political, and we cannot evaluate research projects on the basis of their transforming capability, since the latter is at once dependent on technical competencies institutions possess to be able to penetrate into the social settings. We may have studies with scientific value, but if the institutions have no funding, tools, knowledges, and the like, to connect with the communities, this will be useless, but that is NOT the problem of the social scientist. Rather, the problem the social scientist faces is that of producing quality science, and it seems to me this should be the first and foremost evaluation criterion; then we may add the others. I personally do believe that social scientists have to be concerned about the greater problems besetting our region, and should partake in our processes, and that is the political part of the scientist." FG4.

"Because, if the UABC uses formal or traditional instruments to do research on which are those needs, quite likely the outcomes will be mere simulations, or the society will give no real authentic answers. From my standpoint, you have to approach people with a certain style, and I don't expect everyone to share this point of view, but I do feel you have to approach communities with an open heart, give yourself away, and provide people with something in exchange; then we may earn the right to recognize which their actual needs are." FG5.

In addition, we may access specific international criteria, such as Sustainable Development Goals (SDG), on the 2030 Agenda. When entertaining an environmental vision, many projects may be linked to mid- or long-term social impact processes. Furthermore, involving a sustainable approach as a transversal criterion applicable to research projects would make it easier for the teaching community to work within the framework of the social impact criteria or become involved in an indirect relationship with other SDGs.

"…there's also the ecological impact some researchers have on areas not directly health-related, but which evidently have an impact on the social setting. If we, for instance, have research work on materials recycling, or waste disposal, which have a favorable effect on the environment, that must have a direct bearing on social welfare, or at least that's the way I see things; but ultimately everything is social since mankind is the one who makes everything move around in the world. So yes, we are pushing for an improvement of our environment; we are fostering social welfare with our work." FG1.

"By acting this way we will be harboring a sustainable approach, which includes the funding element, the wealth it has brought; and then there are the people … how much happier people became with the unfolding of a certain project; and then we have the environmental impact. Maybe that's not going to be easy, but it's about those three variables. Perhaps the economic aspect is easier to measure, but those three indicators are the ones that may provide an answer to the problem that is being posed …" FG5.

Discipline-related visible and measurable breakthroughs

A palpable reality on the part of the scientific community of the UABC lies in the difficulties associated with the investment of time needed to conduct quality research since the diversity of actions commonly carried out by professors hinders a punctual follow-up of many projects. So then, what is needed is an institutional accompaniment in stewardship activities for purposes of facilitating processes that entail time and money and in which there is no prior training or expertise. So, opening up possibilities of evaluating social impact, as even the impact theory has over social reality, is a tremendous challenge for all such projects that apparently could not meet this requirement.

110

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

*"I totally agree that it is about more work for us as researchers, and sometimes we even feel like as if we were jugglers, since we have to engage in the basic science area, the lab part, the data analysis, procure funding, teach class, partake in the academic life, and there's even the extra social element, which is that of engaging in linkage affairs. So, if we were to receive a bit more help from the UABC in some of these tasks, whether it be logistics in the technical part, that would certainly be of great help to be able to move forward as researchers; this would obviously have an impact on the UABC, since we would be able to attract more projects, and not just partake in internal summons projects."
FG1.*

"In fact, there's like a tendency, and it would be important to reflect on which is the impact in epistemological terms of the empirical research that is conducted, to see if we're still doing it with theory dating back to the Eighties or Nineties. So then, it seems to me that this is part of asking about the social impact of theoretical research." FG3.

"I would also like to add that research is dependent on the design we are addressing, whether it be on a certain topic, a social problem, or some research problem. Needless to say, in a research problem, theory plays a paramount role, and from the theory we will know where we may part from, and the type of features such problem will have, if it's macrosocial, or microsocial. So that's the nature of approaching a problem. If it's macro, we may look into the structures, and if it's microsocial, we may zoom in on case studies and application methods, as I already pointed out." FG4.

In the case of basic science, generating timely knowledge is essential. Any application should be sustained by adequate handling of science. By the same token, the generation of novel theories may be an exciting scenario for works of a non-empirical nature. The latter walks along with a reformulation of the meaning of a social problem, what a social problem entails, and who the affected players are. So, it is of the utmost importance to walk along a double path, as it were, with one being a proper linkage of research projects with entities outside of the university and seeking to solve concrete problems.

"An important criterion with regard to impact, if we see it from the engineering standpoint, is that of application, and I feel that application is something that's very important; in order to generate a sound application, as I see it, we must be deeply knowledgeable of the basic science that lies behind such application." FG2.

"Based on everything we've been listening to and reflecting on, I still have this question lingering in my mind: How may we create social impact criteria from theoretical research? And I ask this because all attention is placed on empirical work. In fact, there's like a trend out there, and it would be important to reflect on what the impact of empirical research would be in epistemological terms, if we still continue to do theory like in the Eighties or Nineties " FG3.

"We are lacking the epistemology, we need to reflect on the way to conceptualize reality, meaning, we need to see if we are solving any given problem in a faster manner, but ... who is this a problem for? We haven't even reflected on this. If this is indeed a problem, who is it for? We're not questioning why it is a problem. We have to question our own research questions. Starting from that, we have to question the social problem." FG4.

"We may agree that there is indeed a set of problems out there. There's a dynamic that's taking place, and I believe that we have to distinguish or separate linkage from research. We work with both on trying to solve a problem, but we have to likewise structure it to get the acknowledgment of our work, and pinpoint what we are actually working on as researchers." FG5.

During the evaluation process, it is necessary to identify the differentiated characteristics of the research projects. We must also classify them by their primary, applied, or development science incidence. The idea is to identify the positive evaluation criteria during its proposal as a blueprint and

111

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

implementation. The protocols may include minimum-common items: 1) problem statement, 2) congruency and feasibility of goals, 3) coherence of research questions, and 4) relationship between all the components. The role evaluators play is essential, as is their training and knowledge of the topics to afford creditability to the processes. Indeed, processes should be institutionally transparent, and it is necessary to generate dynamics and criteria that respond to the needs of the scientific community. We also need to consider that a project may require various development stages throughout time, so it will be necessary to implement different follow-up strategies.

> *"… If I were an evaluator I would have not have any issue in noting the relevance of a project at that level. However, at times it appears that evaluators at different levels, even at a social level, fail to see these links." FG1.*

> *"And since I've submitted projects here, I feel it's like being against the wall, since the computer system is quite sluggish, or the questions are not very clear, so they evaluate and I personally would not know who the evaluator will be; there's no feedback." FG2.*

> *"How was it possible that a research project with a problem that was not a problem was approved? … but it is in the justification of the Problem stage … I feel that it is there where, to a great extent, we may answer such a question, but indeed I agree that these are specific cases which we may not use as generalizations." FG3.*

> *"I feel we would first have to talk about the minimum basic criteria …First, that a project should be utterly well founded; the problem statement should stem from a well-founded research problem, not from assumptions. Secondly, the goal should be crystal-clear, meaning that in the goal or objective there should be no assumptions out there … it should be completely clear and feasible in terms of the time we as researchers allot to a project. Further, it should respond and be geared towards research questions which need to be very logical. There should be a coherent train of thought between what's being stated, the problem that's being detected, and the questions that are being posed around such problem. Such questions need to be translatable into very clear research objectives. The method being proposed to address the latter should be congruent thereto … There should be congruence, almost like having gears, to put it in mechanical terms … yet another criterion would be that, once we have the outcomes or results, we need to show how we got them. And this is because we would get data, we get the statistics, and we begin to "fix" the data so they may fit our needs and wants … This means we're building our research backwards: we accommodate a statement … How do we achieve this? Well, by having very, very stringent evaluators, who know what any such project is about, and who may oversee such congruency." FG4.*

> *"For instance, may I insist that such an indicator, to the extent it is possible, would do without the need to resort to us as researchers, and instead there should be direct means of consultation for reviewing purposes. So, once again, what I personally try to avoid is the use of a strong word; to the extent I find it possible, I try to avoid simulations … like is common-say throughout the country and that we, as an institution, are not exempt from it. So, it is about avoiding simulation." FG5.*

> *"to undertake a project, we must measure the degrees of maturity such project features so as to be able to come up with a final outcome that may be transferred, since in the implementation and growth parts thereof, we should afford follow-up thereto; I feel therein is where we may measure the true impact. " FG6.*

Dissemination by endorsed means

Evaluating the spread of knowledge as part of the impact hereof is an element that benefits the scientific community and helps push knowledge over to social spaces with which, typically, academia would have no direct relationship. Therefore, the institution needs to generate proposals to serve as a bridge between society and the outcomes or results obtained from research projects. The proposals on the dissemination of knowledge fulfill a permanent social need, and it is precisely for this reason that we

112

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

need to open up the spectrum of possibilities for research outcomes and products to more dynamic results more in tune with the social rapprochement of knowledge. In this sense, the proposals focus on an optimum leveraging of institutional resources aimed at shoring up the dissemination of science.

"Another part would be this thing about publishing on dissemination issues, since many times it does not have to do with the dissemination of science, and yes indeed, I do believe it is important to develop this part, but we also need the necessary support so we may have the tools we need readily available to make things easier for us in terms of meeting our research goals. With regard to the part about books, some years ago I participated in the edition of a book, and I feel there's no support provided by the UABC for its dissemination. Last year I sold around seventy books, but that was because I moved around to do so by promoting the book myself. I was the seller of my own book, to put it one way. I have not seen any support of this kind by the UABC; books are written, yes … but that's it. We need the support to be able to sell on-line, for instance: So we're missing that part … this work entails enormous efforts … and it is important to promote all the work that is being carried out, which is quality work indeed … to better disseminate the results and outcomes stemming from research projects: There's no actual need to hold huge congresses for that matter; just some seminars or symposia would suffice, and held with people who would be interested in the outcomes of the research that was conducted; that is likewise something important which needs to be evaluated." FG1.

"… I feel that one of the indicators that will allow me to evaluate the social impact of research work, and going beyond the evaluation process itself, is that it will open doors to addressing new problems by disseminating the undertakings of the university researchers, so that the society may see and be aware of what we're are doing within the University." FG2.

".. any research project should foresee the training of human resources in research, as well as academic products … but the thing is to not exaggerate by setting a certain amount, whether it be one book, plus three papers, and so on. The idea in this sense would be to set the bar so researchers have be the guarantee that their research projects will have some sort of dissemination; that science will be divulged. I also disagree with the thing about the specificities that were included in the summons, the thing about working between the (academic) bodies, because if you have not worked with other bodies throughout these semesters, it is likely because of a lack of synergy …" FG4.

"If we go back to the question of information towards the sector, I see, for instance that such dissemination is carried out by means of bulletins, or through videoclips. The university has a great broadcasting system, an excellent one at that. So, we can make that happen. For instance, we may design short, one-minute, or minute-and-a-half videoclips, whatever the media options we would allow us to do to broadcast and disseminate our work. As the colleague from Ensenada was saying, it is about ordinary people having visual access to the research results. This would entail a permanent effect and a positive action for the benefit of the society..." FG5.

Dissemination should be observed as a complement of indexed and high-impact publications. Even though there is this tendency towards responsible management of resources, there is also the need to socially spread the research outcomes or results at forums or alternate platforms other than printed media. In this sense, participation at congresses or activities where researchers may exchange experiences positively impacts the advancement of science. It is not about going back to affording top priority to these academic events but instead using them as a parallel and complementary means of impact on the scientific community.

"For instance, one of the most important questions in research is the dissemination of results, and little support is given to participations at congresses. I understand it has been this way because many researchers engage in research tourism. But, from my standpoint, and with my training, ever since I was getting my doctorate, one of the most important factors for my research works has been

113

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

the debate that takes place at congresses. This has hugely enriched my own research works, so I believe that both CONACY as well as the UABC are putting aside the importance they have, or are decreasing the support they provide to these types of participations. I understand why they do it, but I feel not all of us engage in research tourism. I believe it is something that helps researchers quite a bit; I feel this is of the utmost importance for research projects." FG3

"With regard to the consolidation of scientific knowledge, it's very important to have more openness to share what we do at congresses or at any other academic venue for that matter. And I say this from my own experience, in the sense that there's knowledge out there that's generated and that moves around at congresses held. Of course, it is not as it was when I first entered the UABC, since back then it seemed attendance to congresses was on-masse, as it were, and everybody supported us. Even the faculty director used to send us to congresses. But yes, I feel it is an important input to ensure this impact that we're discussing." FG3.

Internal linkage is an element that may potentiate research works. The differences in the development of the scientific community may give way to synergies that harness the experiences gained from members with a higher level of expertise. However, as we speak, the possibility of gaining access to a list of projects and responsible researchers is limited. Moreover, the socialization of projects may positively affect optimizing resources and the search for interdisciplinary projects. Therefore, it would be desirable to have a linkage between academic bodies as a requirement for the registration of projects, be substituted by the generation of internal or external research networks.

"… but something that should be procured is: the linkage (I know it's hard), but maybe look for research groups … someone with whom we can pose parts of projects at different scales". FG1.

"… We must know what types of projects are being undertaken throughout the institution, what type of technology is available; for instance: Ensenada features great technologies; in Mexicali there are great technologies, but of course, each within its area of expertise or specialty; but there are always times in which technologies that fall a bit out of our focus are needed, and collaboration would thus be needed. Just as we as researchers need such dissemination, so the society around us here in the State of Baja California has to know what we are working on. And I'm pretty sure that many of the research projects, each of them in their corresponding areas and specialties, will be of interest to the population, whether it be to approach it, to solve a problem, to become part of the university, and so on; this, I feel, will definitively have an impact at a social level in a transcendental way". FG2.

"…if a research project shows no indication that it is the continuation of another, it should not be dismissed for such reason, although it would be like something favorable to have a project that would follow up on another one, or that in one way or another, would afford continuity. Seen from both standpoints or from both approaches: if it's not continuation of another, how can I afford continuity? … and likewise, if it's the continuation of another, how am I going to work on it?" FG3.

"Evaluation criteria should not focus solely and exclusively on work done by the academic bodies; they of course have to be incorporated, but we should see that demands are not reduced to the work carried out by such academic bodies, and this merits a fundamental criterion." FG4.

"One thing we see is that listings of research projects are not publicly available on open websites or pages, meaning they are not open to the public. So, if we want to know what projects are out there, we need to ask for such information; the listing is then sent out to the coordinators of the various faculties. So then, how feasible is it to make those listings public? FG5.

Proposal of Indicators to Evaluate the relevance of Research

Following, we delineate concrete proposals common at focus groups to be considered indicators in evaluating the research's social relevance.

114

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

1. Take the Linkage Committee model used at the Engineering Institute as a mechanism to guarantee and evaluate cooperation and collaboration with sectors foreign to the university, as well as the quality of the latter.

2. Take the Sustainable Development Goals (SDG) and National Strategic Programs of CONACYT as references to consider relevant topics in the different areas of knowledge by considering the conditions and needs of the local context.

3. Particularly in applied sciences, implement as a requirement the consultation of the population participating in the research project and/or beneficiary thereof so that, on the one hand, we may come up with a diagnostic of the needs of such population. On the other hand, we may evaluate the project's benefits to the community.

4. Create differentiated criteria for basic and applied sciences.

5. Create continuous evaluation processes, beginning with the presentation and establishment of research protocols for determining their social relevance and theoretical, methodological, and epistemological relevance per the area of knowledge and application field of the project.

Proposal of Indicators to evaluate the Impact of the Research

1. Identify in the protocols the problem sought to be resolved.
2. Statement of a solution proposal in the research projects.
3. Identify the local, regional, national, and international linkage.
4. Identify if the problem stated responds to the SDGs.
5. Consider the production of knowledge, both theoretical and methodological.
6. Indicate in the protocol the sector with which the research is intended to be linked or impacted for its possible evidence after the project.
7. Evaluate the methodological congruency of the projects.
8. Indicate the divulgation and dissemination of the results.

Proposal for indicators associated with ethics

1. Implement requirements for establishing ethics protocols in research projects.
2. Incorporate letters of informed consent from the populations or participants of the research projects.
3. Establish and set forth the safekeeping method that will be used with the information and personal data of the participants in the projects.

Institutional Suggestions (In Vivo).

1. Acknowledge scientific diversity to build knowledge.
2. Foster scientific rigor: congruency between the paradigm, the model, and the lexicon.
3. Foster transdisciplinarity.
4. Linkage with the problematized sectors and link the project's problems with the essential cores of the regional or national problems.
5. The research design should be classified in tune with the projects undertaken in basic, applied, or development science.
6. Push for the products/evidence to be incorporated into the divulgation of science.

115

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

7. Promote mechanisms for the internal dissemination, divulgation, and socialization of projects and individual lines of the community.

CONCLUSION

Evaluating the relevance and impact of research in the University setting is complex since many external and internal factors affecting the dynamics of the undertakings of the academic community intertwine.

Among the external factors, we have the permanent evaluation to respond to the criteria set forth by the Teaching Professional Development Program and, to a greater extent, the Mexican National Researcher System. Participation in an internal summons for research funding stands out among the internal factors. This is due to the fact that, upon the criteria becoming increasingly complex, access to institutional funding options is constrained. Such factors encompass not only the needs researchers have to meet the requirements reflecting their enablement but also incorporate a series of needs and stresses not singular to the UABC, but that affect the work dynamic.

The most significant resistance on the part of the community is found to be associated with two conceptions that differ from the research undertakings. On the one hand, the association between the substantive functions of the university as a knowledge-creating entity and, thus, the consideration that optimum conditions for its practice should exist. Moreover, on the other, a vision entails a greater pragmatism that subordinates the generation of research to the obtainment of external resources that make it possible. Both considerations preserve a conducting thread that observes and foresees an economic crisis spilling over to academic space and requires public policies associated with a more significant injection of funding or resources in the scientific setting.

The visibility of scientific production responds to criteria that evaluation systems have incorporated from international metrics. In addition, however, there is a need to generate strategies for disseminating and divulging research results within the institution, as well as developing criteria to foster internal linkage of the various projects.

In the impact realm, numerous experiences shape how both male and female researchers account for the influence of their work. The diversity of disciplinary areas makes it difficult to develop general criteria for its evaluation. However, such diversity makes it possible for the institution to respond to the needs of its scientific community.

More specifically, incorporating the UABC organizational structure and the involvement of peer instances, such as academies, or ethics and research committees, should be considered as part of the validation of future projects. As of the new transparency and access to information policies, patent development, and acknowledgment of copyrights, the university should move towards an integrative model of the research endeavor without detriment to the other substantive functions.

The most constant element in researcher participation may be that of a genuine concern to be incorporated into the institutional dynamics and respond to emerging needs. However, it is also true that there exists a logical preoccupation to avoid a more significant workload on administrative processes, which entails that the challenge lies in energizing how research projects are integrated. In contrast, at once the specific criteria for evaluating the relevance and impact of research conducted within the UABC are developed.

116

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

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117

Qualitative indicators to evaluate the relevance and social impact of public university research in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano

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118

Qualitative indicators to evaluate the relevance and social impact of public university research
in northwestern Mexico
Emilia Cristina González-Machado, Ernesto Israel Santillán-Anguiano