Relevance of Higher Education. How to measure it? The case of masters of engineering in Peru

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Abstract - Existing evaluation models for higher education have, mainly, accreditation purposes, and evaluate the efficiency of training programs, that is to say, the degree of suitability between the educational results and the objectives of the program. However, it is not guaranteed that those objectives adequate to the needs and real interests of students and stakeholders, that is to say, they do not assess the relevance of the programs, a very important aspect in developing countries. From the review of experiences, this paper proposes a model for evaluating the relevance of engineering masters program, and applies it to the case of a master's degree at the University of Piura, Peru. We conclude that the proposed model is applicable to other masters program, offers an objective way for determining is a training program keep being relevant, and identifies improvement opportunities.
Key words: relevance, evaluation, engineering training.

I. INTRODUCTION

Relevance of higher education should be assessed according to the adequacy between what society expects from the institutions, and what they do [1], [2]. The concept of relevance in the context of programs and projects management is understood as the adequacy of explicit objectives of an intervention, with regards to social-economic problems that the intervention intends to solve [3]. It is important in an intermediate evaluation because it is necessary to prove if the context has been developed as expected, and if this development brings into question certain initial objectives.

Relevance in engineering graduate training is important due to two reasons. The first one refers to the reason for being engineering: solving environment problems, and meeting the demands of the population to improve their life conditions. The second one has to do with the characteristics of the graduate degree. A masters program must provide specialized knowledge, either in order to develop abilities for professional performance of the engineering career (professional masters program), or as the first step in developing a doctorate (masters program in research).

There should be a close relationship with the environment, so that the objectives of the training programs are consistent with the real needs of students, the university and the community. This issue in developing countries is very important [4] where postgraduate training faces the dilemma of being globally competitive and meeting local and domestic needs with the teaching and the investigation. [5], [6], [7], [8].

Therefore, we need evaluation models to measure this adequacy degree between the objectives of the programs with students and stakeholders needs. However, the existing evaluation models have mainly accreditation purposes, and they are designed to evaluate the efficacy, that is to say, if the results obtained are in agreement with the mission and the objectives proposed. Their objective is not to measure the relevance.

This paper reviews the relevance concept in higher education, and reviews the experiences on postgraduate training in engineering and evaluation for purposes of accreditation. Then, a model for evaluating the relevance for engineering masters program is proposed, presenting the application case at the University of Piura, Peru.

II. RELEVANCE IN ENGINEERING MASTERS PROGRAM: TYPES, DIMENSIONS AND FACTORS FOR ITS EVALUATION.

Engineering graduate degrees must meet international quality standards. However, in developing countries, the application of knowledge acquired, especially in professional master's degrees, is generally limited to a national or local geographical area. However, it can be considered, according to Marginson & Rhoades [9] and Yang R. [10] that the masters program must be: Global Relevance and Local Relevance.

Global relevance mainly refers to compliance with global standards such as the mobility of teachers of the masters program, their participation in networks and externally funded projects, among others [5], [11].

Local relevance refers to several aspects that may be grouped in three dimensions. The first dimension of Local relevance is the Personal Relevance of the Masters Program. This has to do with the personal satisfaction of students, graduates, and employers. A masters program of engineering is relevant if it meets the student training needs, that is to say, if there is an adaptation of the contents (curricula) with the needs and interests of students and with the needs of the labor market [12]. These students are professionals who work in a context where the specialized knowledge is necessary for problem solving. A graduate of the program will be happy is the masters program helped improving labor performance, to develop necessary competences, to improve his/her employment situation (salary), and if the masters program is in contact with him after finishing the program. Employers, at the same time, will be satisfied if the best job performance from these students, achieved by the masters program, benefits the company [13].

The second dimension is the Social relevance that has to do with the involvement of teachers from the masters program (and the investigation they perform) with the local/national environment and not only with the global environment [6], [14]. According to Etzkowitz et al. [15], the interactions between the university, the industry, and the government are the basis for accessing the economic development. A masters program is more relevant is the scientific investigation it promotes is multidisciplinary and focused on problems [1], [16] and if the masters program final projects are aimed towards solving problems at the companies or to the development of innovation projects [17], [18].

The third dimension is the Institutional Relevance that has to do with the alignment of the objectives from the masters program with the mission, objectives and policies of the university that teaches. For example, there must be correspondence between the management and the administration of the masters program with the working policies and procedures of the institution that welcomes it, because it is ultimately this one the one that decides the teaching or not of the masters program. Also, the masters program adequate more to the needs and interests of the university that hosts it if it helps to fulfill its mission of investigation and provides visibility, that is to say, if their teachers investigate and publish the name of that university.

In order to assess the relevance of an engineering masters program, four factors are established according to the types of relevance and its dimensions.

Figure 1. Factors of relevance
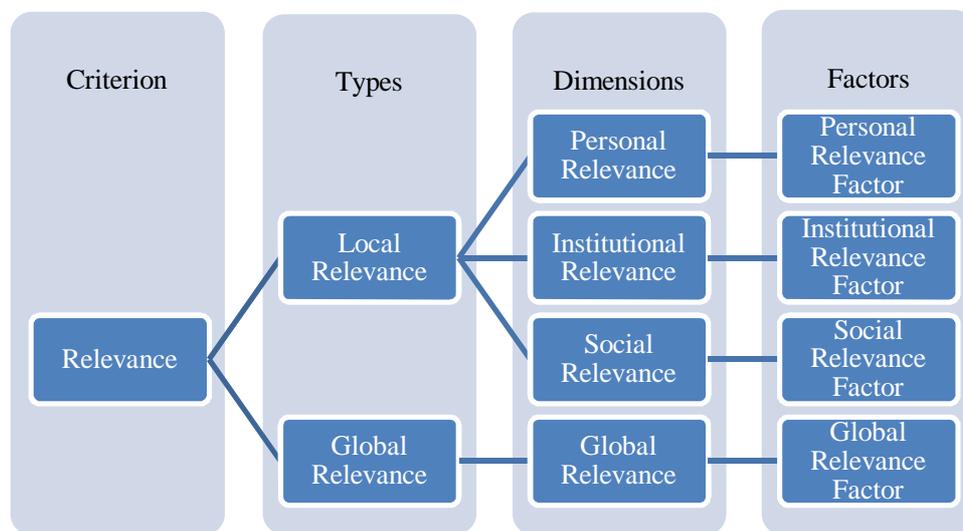
Source: Self-made

This four relevance factor approach of a training program solves the problem that relevance has had in recent years. With an economic approach, we have been considering that a curricula, a research or an institution have relevance when they respond to Market demands, its production is efficient in terms of immediate applicability, are profitable, and allow obtaining external financing. With the approach that this paper proposes, the needs and interests of all stakeholders and not just the ones from the productive economic environment are considered.

III. INDICATORS OF RELEVANCE ASSESSMENT

In each relevance factor, we can identify aspects that give us an idea of the adequacy degree of the master's program objectives with the needs and real interests from students and stakeholders. In order to identify these aspects, we analyze the following:

- Higher education and its relevance.
- Production of knowledge in a global integrated system: Gibbons Mode 2 [2].
- Postgraduate training in engineering.
- Evaluation criteria and indicators from the main international accreditation bodies according to Eaton [19]: ABET, the EUR-ACE Project from the European Network for Accreditation of Engineering Education (ENAEE), the Council for Higher Education Accreditation (CHEA) from the United States, among others.
- The evaluation criteria and the indicators from the main postgraduate accreditation Latin-American bodies: the "Programa Nacional de Posgrados de Calidad" (National Program for Quality Graduate Degree) (PNPC) in México, the "Coordinación de Perfeccionamiento de Personal Superior" (Coordination of Improvement of Senior Staff) (CAPES) from Brazil, the "Asociación Universitaria Iberoamericana de Postgrado" (Iberoamerican University Association for Graduate Degree), among others.

This analysis considers the needed connection of the university and the masters program with its environment to satisfy their needs, meet their demands and interests, and solve their problems.

Figure 2. Identification of evaluation indicators of the relevance
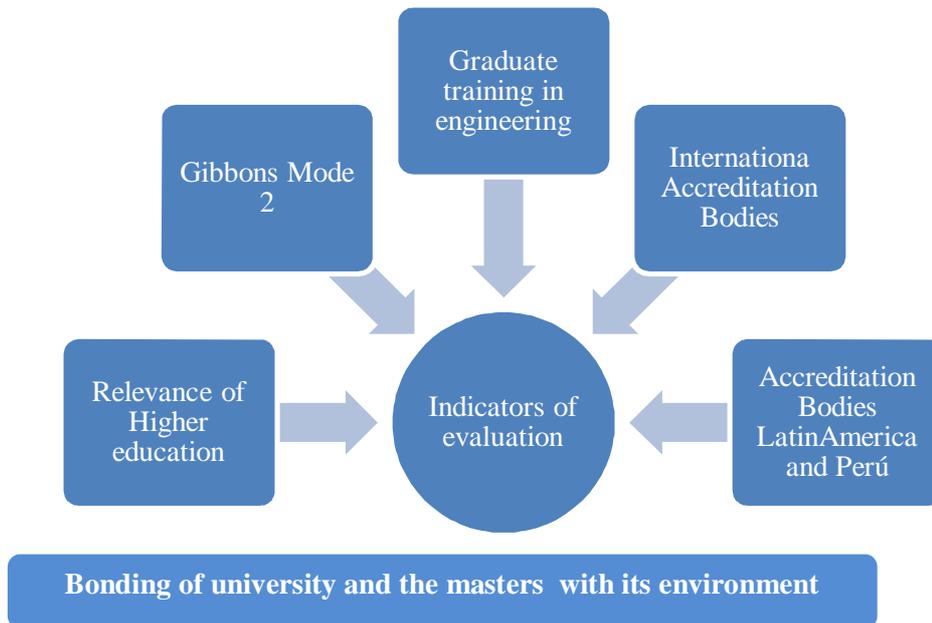
Source: Self-made

The main aspects of relevance from an engineering masters program identified in this analysis are presented in Table1.

**Table 1. Relevance aspects identified from the theoretical framework**

Relevance higher education	Relationship with the environment	Gibbons Mode 2 and GESPLAN methodology	Engineering graduate training	International Accreditation Bodies	Latin-American and Peru Accreditation Bodies	Aspect of relevance
X					X	Helps for a better job performance.
X					X	The topics are of the student's interest.
		X			X	Monitoring system for the graduate performance.
X					X	Helps getting a raise, promotion.
X					X	Updated syllabus considering students and graduates.
				X		Mission and objectives correspondence with the curricula.
		X				Number of students. Admitted/applicants ratio.
	X	X	X	X	X	Teachers publish papers in ISI or Scopus.
X					X	Consistency masters program – university in misión, objectives and values.
X					X	Consistency masters program – university in job procedures.
		X			X	Undergraduate programs related to the masters program.
X	X	X				Takes advantage of local and national opportunities.
X	X	X				Relationship with priorities of local and national development.
X	X	X			X	Satisfies real needs of the town and the country.
X	X		X			Masters program final Project solve problems in the companies.
	X				X	Relationship with programs from other institutions.
				X	X	Advisory committee comprised by groups of interest.
	X	X		X		Teachers participate in networks and associations.
	X			X		Teachers have academic mobility.
		X		X	X	Teachers incorporate current investigation results.
		X	X			The organization facilitates the multidisciplinary investigation.
	X	X				Investigation projects with foreign financing.
		X	X			Transdisciplinary and innovation is encouraged.
			X			Learning based on projects approach.

Source: Self-made.

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IV.   EVALUATION MODEL OF THE RELEVANCE OF A MASTERS PROGRAM IN ENGINEERING.

For the design of the model, we have defined the three components showed in Figure 3: a) Principles, characteristics and definitions of the evaluation; b) Content of the evaluation, and c) Methodology of the application.

Figure 3. Evaluation model of the relevance of a master's program in engineering.
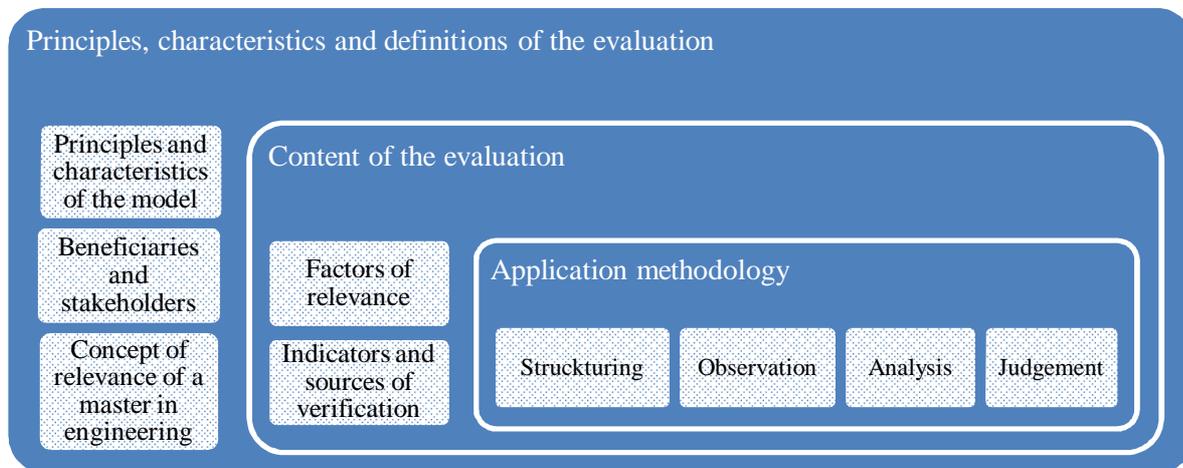
Source: Self-made

It is an intermediate evaluation because a master's program in progress is assessed. It is a thematic evaluation because it analyzes across an issue: the relevance. It is an external evaluation because it is appropriate that a professional person outside to the masters program performs it. It is a training evaluation because it is the purpose of the learning and a continuous improvement. The characteristics of the model, deriving from the previous framework presented, are: participation, learning, complementation of the sources (primary and secondary), complementation of the approaches (qualitative and quantitative) and simplicity.

The main beneficiaries of a master's program on engineering are students. The model presented can be applied to full time masters program and part-time masters program, professional masters program and research masters program. In the specific case of a part-time masters program, it is considered that students go to the university due to a need for permanent training, mainly because they wish to specialize in a engineering branch to improve their labor performance. They need specialized knowledge to apply what was learned and to innovate in their professional work, as well as having another degree to allow them having a more competitive resume.

Employers, either they finance or not the masters program, also are beneficiaries of these programs, because it impacts them the improvement in the student's job performance. Local and national community is also benefits from it, because it will have more competitive professionals to solve their problems and meet their demands. The university offering the masters program is one of the main stakeholders because through this masters program they are fulfilling part of their mission, not only the teaching part but also the investigation part, integration with their community and contribution to development.

An operational concept is used for the relevance. A masters program of engineering is relevant if the objectives proposed are adapted to the needs of student training, if they adapt to the interests of the university, if it solve problems from the social-economic context, and contribute to the development of their community, inserted always in a production system of global knowledge.

The relevance factors are the ones showed in Figure 1, and the evaluation indicators are presented in the model application item (Table 2). These indicators are derived from the relevance aspects identified from the theoretical framework, and have been validated with experts in the subject. The methodology for the application of the model is commonly used for the evaluation of programs, and has 4 parts: structuring, observation, analysis and judgment.

The model is consistent with the assertions by Olds et al [20], in that what should drive an educational investigation and an assessment should be questions and not the methods. Evaluators should examine what they wish to know choosing the best possible methodology to answer to the questions. We consider two sub processes: "assessment" and "evaluation". The assessment consists in the gathering of information according to indicators and verification sources previously defined, and then people in charge of the evaluation of the program should perform the evaluation, that is to say, the interpretation of that information and the issuance of a judgment on that regard. We assume that soft competences set by the masters program remain valid at the time of the assessment of the relevance. Therefore, the information gathering is not considered to verify if those competences are appropriate or not.

V. RESULTS FROM THE APPLICATION OF THE MODEL

The model was used for assessing the relevance of the Civil Engineering Masters Program with a major in Road Engineering from the University of Piura, Peru. The main objective of the evaluation was to find out if the objectives of the masters program and its processes still adapt to the needs and real interests of the students and stakeholders.

The masters program evaluated aims to "training for the design, construction, and management of portfolios, with basic knowledge in Transportation Engineering". This is a professional type masters program, part-time (Friday and Saturday). It lasts for two years. It began to be dictated in 2003, and it has 25 teachers (15 from the University of Piura, and 10 from foreign universities). Today, it has 5 graduate classes.

We had awareness meetings with the management and the academic Committee of the masters program in which we explained the assessment model. We defined as a target to generate a learning experience for the purpose of continuous improvement and sustainability. The director of the masters program made the commitment and took the leadership in order to take forward this process.

We used the indicators and sources of verification showed in Table 2. The information was collected from primary and secondary sources. The primary sources were surveys and interviews put together from the evaluation indicators. The surveys were applied to the main groups of interests from the masters program: students, teachers, graduates and employers. The interviews were addressed to managers from the masters program and managers from the university: The Dean from the Engineering Faculty, the Vice Dean of Research and Graduate Degree from the Engineering Faculty, the General Manager, and the Rector of the University. The secondary sources were documents and artifacts for master's program management. The reliability of the results we guaranteed by comparing and validating the results obtained for the same indicator from different sources.

The surveys were previously validated by experts from the University of Piura, and tested with a small simple of students, graduates, and employers. After the validation, they were applied between April and June of 2014. We used a Likert scale from 1 to 5, where the value 1 indicated that the surveyed person was "Strongly Disagree" with the affirmation associated to the evaluation indicator, and 5 indicated that the person was "Strongly agree" with that statement.

Because the number of people in each group is low (less tan or closet o 100), we chose a non-probabilistic simple for convenience, that is to say, gather information from the largest possible amount of people. It was correct to do this because the assessment that was sought was the descriptive type.

A. INFORMATION ANALYSIS

In the case of surveys, we joined the categories "Strongly agree" with "Agree" and "Strongly disagree" with "disagree". Bra graphs were created for each indicator in which we compared the results obtained for the different groups of interest. An example is shown in Figure 4.

Figure 4. M Indicator: The masters program utilizes the local and national opportunities for the benefit of their students and teachers.
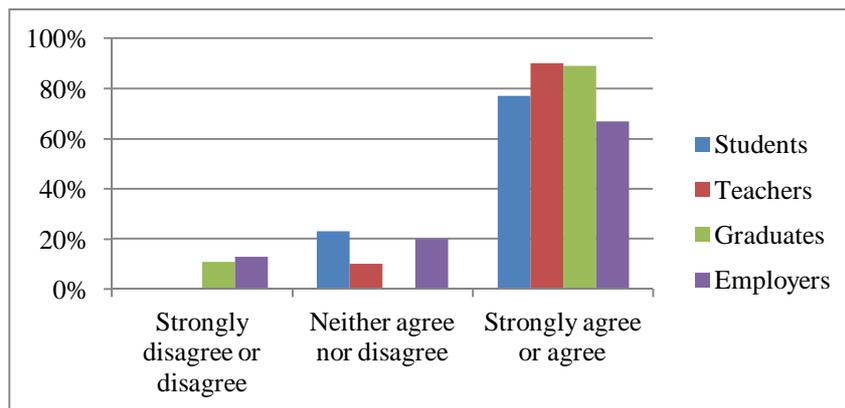
Source: Self-made from the survey results.

Then, we considered only the results from the sum up of "Strongly agree" and "Agree" for each indicator, and we compared the different groups of interest. The results are shown in Table 4.

Table 2. Indicators and verification sources to assess the relevance of engineering masters program

Relevance factor	N°	Indicator	Surveys				Interviews		Documentary analysis
			Students	Teachers	Graduates	Employers	Masters program Managers	University Managers	
Personal Relevance	A	The knowledge obtained in the masters program helped to a better job performance.	x		x	x			
	B	The topics taught during the masters program are related to the work issues or are of the student's interest.	x		x				
	C	There is a tracking system to the graduate's performance.			x		x	x	
	D	Taking the masters program helped improving the job situation of the graduate (getting a wage increase, a raise or obtaining a better job).			x				
	E	The syllabus update considers the student's and graduate's opinion.		x					
Institutional Relevance	F	Number of students in the masters program.					x		x
	G	Admitted/applicants ratio in the masters program.					x		x
	H	Teachers (full time or part time) have published a paper in ISI, Scopus or Scient Direct using the name of the university in the last two years.		x					
	I	The mission and objectives of the program are consistent with the mission, objectives and values of the university.					x	x	
	J	The master's program management is carried out according to the job policies and procedures of the university.					x	x	
	K	There is correspondence between the mission and the objectives of the masters program with the curricula.	x		x		x		x
	L	The university offers undergraduate or specialization programs related to the masters program.					x		
Social Relevance	M	The masters program takes advantage of the local and national opportunities for the benefit of their students and teachers.	x	x	x	x	x	x	
	N	The study plan is related to the priorities of local and national development.					x	x	x
	O	The study plan helps satisfying real needs of the location and the country.	x		x				
	P	The end of masters program projects apply or solve problems in the companies.			x	x	x		
	Q	There are effective relationships with similar programs from other universities, companies, government agencies, NGOs, among others.					x		x
	R	The masters program has an advisory committee comprised by representatives from the main groups of interest.		x			x	x	x
Global Relevance	S	Teachers participate in scientific or professional networks or associations.		x			x	x	
	T	Teachers have academic mobility.		x			x	x	
	U	Teachers update syllabus incorporating the results from their research or the results from recent investigations in the subject.		x					
	V	The organization of the university eases the multidisciplinary investigation and focused on problems.		x			x	x	x
	W	Teachers participate in research projects with foreign financing (national or international).		x			x	x	x
	X	The courses promote the transdisciplinary and the motivation.	x	x	x		x		x
	Y	We use a learning approach based on projects.	x	x	x		x		
		TOTAL	**7**	**10**	**10**	**4**	**17**	**8**	**9**

Table 4. Survey results from the Masters in Road Engineering – Sum of "Strongly agree" and "Agree".

N°	Indicator	Students	Teachers	Graduates	Employers
A	The knowledge obtained in the masters program helped to a better job performance.	100%		94%	87%
B	The topics taught during the masters program are related to the work issues or are of the student's interest.	97%		89%	
C	There is a tracking system to the graduate's performance.			36%	
D	Taking the masters program helped improving the job situation of the graduate (getting a wage increase, a raise or obtaining a better job).			83%	
E	The syllabus update considers the student's and graduate's opinion.		60%		
H	Teachers (full time or part time) have published a paper in ISI, Scopus or Scient Direct using the name of the university in the last two years.		55%		
K	There is correspondence between the mission and the objectives of the masters program with the curricula.	90%		92%	
M	The masters program takes advantage of the local and national opportunities for the benefit of their students and teachers.	77%	90%	89%	67%
O	The study plan helps satisfying real needs of the location and the country.	81%		72%	
P	The end of masters program projects apply or solve problems in the companies.			33%	33%
R	The masters program has an advisory committee comprised by representatives from the main groups of interest.				20%
S	Teachers participate in scientific or professional networks or associations.		95%		
T	Teachers have academic mobility.		80%		
U	Teachers update syllabus incorporating the results from their research or the results from recent investigations in the subject.		95%		
V	The organization of the university eases the multidisciplinary investigation and focused on problems.		30%		
W	Teachers participate in research projects with foreign financing (national or international).		45%		
X	The courses promote the transdisciplinary and the motivation.	90%	90%	83%	
Y	We use a learning approach based on projects.	81%	90%	75%	

Source: Self-made.

B.   RESULTS FROM THE INTERVIEWS AND DOCUMENT ANALYSIS.

The interviews were semi structured, according to the indicators contained in Table 2. There was a natural resilience to be evaluated. That's why it was important to emphasize the objective of the evaluation: the learning experience and the continuous improvement. Finally, the interviews were performed without inconveniences. The document review was made where appropriate. The mission, objectives and values of the masters program are consistent with the mission, objectives and strategies from the University. A clear example is the inclusion in the curricula the modules: "Individual, Family and Business", showing consistency with the humanistic education and in values the university promotes.

The management of the masters program does develop itself according to the work policies and procedures of the University. However, it does not have a formal system for monitoring the performance of graduates. Although some activities are developed referred to this topic such as: training and updating requirements, job offer needs, awareness of events, courses, job board, the system is not institutionalized neither to university level nor to Faculty level. One of the requirements to be admitted in the program is to have the Bachelor degree or degree in Civil Engineering (equivalent to Roads, Channels and Ports Engineering) and the University of Piura does offer that career. In the specialization programs (diploma courses) related to the masters program, there is the diploma degree in "Management of construction projects".

The masters program does take advantage of the opportunities for local and national development because much part of the construction boom currently Peru is going through is due to the strong public and private investment and is being made on roads, since the infrastructure deficit of the country is very large. According to the document "Agenda Competitiva 2012-2013" (Competitiveness Agenda), the content of the curricula is related to the orientations of local, regional and national development; and with the trends of existing professional exercise.

The requirement to get the Masters degree is the performing a "thesis", and currently this is a problem. There are only 15% of graduates. The main reason is that the masters program is a professional type, and not a research masters program, and that has not been clear since the beginning. This is why, many "thesis" plans do not meet the requirements of originality, of generating the knowledge nor performing theoretical generalizations and therefore they are rejected. It was not clear if that masters program, because the approach it has should not require a "thesis" but it must require a "end of masters program project", that is to say, a work consisting in submitting a technical solution about a case the participant is facing in its professional life or an investigation applied to meet any need of the region. The masters program has promoted the continuity in the effective relationships with similar programs from other friendly universities in the US, Latin America and Europe, through international weeks (visits), Exchange of professors and the launching of a similar masters program in another country like Ecuador. Also, we keep contact with business and governmental agencies for the enrolment of some of their workers, conducting seminars, job board, among others. Although there is that link with some companies and state entities, the masters program however does not have institutionally an advisory committee comprised by representatives from the main groups of interest.

Teachers from the masters program could be classified in three types: foreign university teachers, national scholars (basically professors from the University of Piura) and national professionals (executives from prestigious companies). It is about having the three types in equal amounts. Teachers do participate in networks or scientific or professional associations, and have academic mobility.The organization of the university does not facilitate the multidisciplinary research and focused on problems. Its organization is based on academic disciplines. This problem is faced by many universities and university systems [21].

There is no institutionalized system for promoting the design and execution of research projects. Currently, there are isolated efforts from some teachers for executing research and innovation projects financed by the "Consejo Nacional de Ciencia, Tecnología e Innovación – CONCYTEC" (National Council of Science, Technology and Innovation), although the research on road engineering (subject of the masters program) is not a national priority according to the document "Estrategia Nacional para el desarrollo de la Ciencia, Tecnología e Innovación de Perú" (National Strategy for the development of science, Technology and Innovation of Peru).

The syllabus is updated according to requirements from students and graduates. Proof of that is that in the version of the masters program dictated in the city of Lima, it is not considered, at the suggestion of students, the topic related to the El Niño phenomenon, a climate phenomenon affecting only the north region of Peru where Piura is located. Other issue is the one referred to the urban transportation. The economic growth has made the city of Piura growing very fast, and that traffic is today a major problem. At the suggestion of students and graduates, we are focusing in Transit and Road Safety techniques and tools.

The masters program, because the professional approach it has, promotes a lot innovation, which it is reinforced with policies from the university and national governmental policies. The weakness is in not institutionally transdisciplinary, and this problem is understood because, as previously said, the university has an organization based on disciplines. Then, the curricula and therefore the syllabus of the courses are organized also according to what the disciplines produce. This framework makes difficult also developing a learning approach based on projects.

There are some policies or ways of operating from the university that may affect the relevance of the masters program. There is the perception that one of the criteria to decide the launching of a masters program is the necessary inclusion of full time teachers from the university in the teaching staff of the masters program in order to increase the income of those teachers. This would involve forcing the selection of master's program teachers, and not meeting, in some cases, the required profile.

In the document review, we also reviewed the following documents: Annual Masters Program reports, Manual of Organization and Roles, University Idearium, contracts and projects reports of research from national teachers.

C.   JUDGMENT
According to the results shown in the previous sections, we can issue the following opinions about the relevance of the masters program.

1)   Personal Relevance:

The masters program has high personal relevance: helps to improve the job performance of students, topics dictated are of interest for them and when they graduate, the masters program allows them improving their job situation (obtain a better salary). The aspects that need improvement are two: institutionalize a tracking system to the graduate's performance and update the syllabus considering more the opinion from students and graduates.

2)   Institutional Relevance:

The masters program has high institutional relevance: has met the goals of openings every year, there have always been more applicants than admitted. The mission and objectives of the masters program are consistent with the mission, objectives and values of the University of Piura. The management of the masters program is developed according to the policies and work procedures of the University of Piura, and there is correspondence between the objectives of the masters program and what really is taught. The aspect to improve is the level of scientific production of its teachers, specially the nationals, so that they grant more international visibility to the university.

3)   Social Relevance:

The masters program has high social relevance. This is mainly due to that Peru is going through sustained economic growth phase, and a boom in the construction sector. The masters program takes this opportunity to have more cases of study and an immediate applicability of knowledge given out. Therefore, it satisfies a local and national need. The aspects to improve are two: the first one is to increase the number of graduates with end of masters program projects to solve problems or meaning the application of a technique of road engineering. The second aspect consists of institutionalizing the participation of different groups of interest (employers, graduates, students, etc.) on the improvement of the management of the masters program with the creation of an Advisory Committee.

4)   Global Relevance:

The global relevance of the masters program is considered average. Several international standards of quality are met, such as having foreign teachers, teacher mobility, networks or associations to whom teachers belong to, and the updating of syllabus. However, other standards still need to be met, that are very important for the international visibility of the masters program and the University of Piura.

The masters program is professional type, but the investigation continues being important. Currently, teaching and research are considered in the graduate program as two sides of the same coin. In this case of professional mastery, research must be applied, focused on local and national problems but always with international visibility. It is this aspect in which the Masters in Road Engineering still fails. The causes are many, one of them is the same organization of the university, which does not facilitate the multidisciplinary research and focused on problems. This causes that practically there are no research projects with external financing in which teachers of the masters program participate, which at the same time causes to have few publications from teachers in international prestigious indexed magazines.

VI.   CONCLUSSIONS

The model allows assessing the level of relevance of the masters program. It is possible to value the degree of satisfaction of the needs and interests from students and from the university that hosts it, as well as the degree of linkage of the masters program with its local/national environment, and with the international system of higher university education.

The model allows using a descriptive judgment on the relevance of the masters program. You may use, for each dimension of the relevance, the categories: low, medium, and high relevance. This assessment is the one that corresponds, because the number of people who are part of each group of interest is low, and the indicators and of qualitative type. The information collected with the surveys is collected with the interviews and the document analysis in order to issue a comprehensive judgment. The important thing is to identify the opportunities of improvement or the weaknesses that is necessary to overcome, and the assessment model orients this process objectively.

We have had some difficulties such as an initial resilience to the evaluation that was overcome with awareness meetings where we explained the model, as well as the importance and the objectives of the evaluation. Also, initially we obtained a low response rate to the online surveys. To overcome it, we called by pone in order to reiterate them the request of filling up the survey, thanking them in advance for their collaboration.

The quadrant graph to compare the results from the survey to students with the results from the survey to graduates is useful mainly when you have both very high values and very low values, in both cases. When all the values are high or all the values are low, there is no sense in using it because it would be like the entire graph comprises one of the quadrants.

To present the results of the evaluation, it is highly recommended to always follow a diagram of the four dimensions of relevance (presenting the indicators in alphabetic order) to facilitate the analysis and so the conclusions are more compelling.

The masters program evaluated is professional type, part-time, in a non-profit private university and in a socio-economic context of sustained growth but with a lot of needs of professional training from the job and professional market.

The masters program has not have problems in filling their vacancies in all the versions it had. However, the challenge is that the masters program is of quality and sustainability. For that, it needs to be relevant, that is to say, to satisfy the training needs from its students, help the university to meet its mission, inserting it in the global system of knowledge production taking advantage of the opportunities that the local and national environment provides.

Although it is about the assessment of a master's program that already has years running, the conclusions also serve to the Engineering faculty and in general to the University of Piura for the design of new masters programs. There are aspects to improve that depend more on institutional arrangements like the tracking system to the performance of graduates, the creation of advisory committees, incentives for the development of end of masters program projects, the organization of the university so that it facilitates the interdisciplinary research and focused on issues, among others.

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