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Strategies for research groups to boost their degree of consolidation

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Abstract

In Mexico, formal research groups are known as Academic Bodies (AB) and are recognized by a government program called Program for Professional Teacher Development (Prodep). Universities do not always manage these formal research groups and their evolution, for this reason the objective of this research is to analyze the universities in the state of Oaxaca that have AB to identify the variables that affect the evolution in its degree of consolidation and propose strategies for its management. The methodology used is the Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis and as a result, an operationalization of variables was obtained according to the operating rules of PRODEP in Mexico for the AB. The measurement of the productivity of the AB, the variables knowledge regarding the rules of operation, invariable features of the consolidated academic bodies, strategic planning and evaluation instrument were studied. In addition, a strategic plan was developed in order to encourage the members to continuous improvement and thus have an increase in the consolidation of the AB.

Keywords: Academic Bodies; Strategic Planning; Universities.

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Estrategias de los grupos de investigación para impulsar su grado de consolidación

Resumen

En México a los grupos formales de investigación se les conoce como Cuerpos Académicos (CA) y son reconocidos por un programa de gobierno que se llama Programa para el Desarrollo Profesional Docente (Prodep). Las universidades no siempre realizan una gestión respecto a estos grupos formales de investigación y su evolución, por tal motivo el objetivo de esta investigación es analizar a las universidades del estado de Oaxaca que cuentan con CA para identificar las variables que afectan la evolución en su grado de consolidación y proponer estrategias para su gestión. La metodología empleada es el análisis de Fortalezas, Oportunidades, Debilidades y Amenazas (FODA) y como resultados se obtuvo una operacionalización de variables de acuerdo a las reglas de operación de PRODEP en México para los CA. Se obtuvo la medición de la productividad de los CA, se estudiaron las variables conocimiento respecto a las reglas de operación, rasgos invariables de los cuerpos académicos consolidados, planeación estratégica e instrumento de evaluación. Además, se desarrolló un plan estratégico con la finalidad de impulsar a los integrantes a la mejora continua y así tener un incremento en la consolidación de los CA.

Palabras clave: Cuerpos Académicos; Planificación Estratégica; Universidades.

1. Introduction

Research groups in Mexico are called Academic Bodies (AB), integrated by Full-time Professors (FTP) and registered in the Program for Professional Teacher Development (PRODEP). They have three levels in terms of their consolidation degree, the First level is the Academic Body in Formation (FABF), the second is the Academic Body in Consolidation (ABIC) and the third level is the Consolidated Academic Body (CAB) which is the most advanced level regarding the trajectory of the AB, as was described above by PRODEP

(2022). These levels of consolidation are governed by the authorization of professors, that is, their level of studies, the teaching given, the administrative management, the thesis supervision, the accompaniment as a tutor and the academic production that focuses on research. They are professors evaluated every three years and ABs can begin their registration at any of the three levels, however they will be evaluated by the PRODEP Peer Committee, which is made up of professors with the highest academic level and who generally belong to the System. National Institute of Researchers (NIR) and belonging to

CONACYT, once they are evaluated by the National Institute of Researchers they can receive any of the three levels and even not be recognized by PRODEP due to lack of compliance with the minimum requirements of the PRODEP Operation Rules (OR).

When the moment of evaluation arrives, the AB can request the level they want to be registered in, for example a FABF would request the next level which would be ABIC. At this stage is when the ABs have atypical behaviors, many can go up or down. In some cases they lose their registration due to the following reasons:

For not meeting the minimum number of members. In this case the minimum is three but if a AB had three members and one leaves at that time, they are in a condition to lose their registration, so they have to manage the entry of a new member, who must be FTP attached to the University to which AB said belongs to.

Lack of records in the PRODEP Unified System (SISUP) regarding the activities of the AB. This means that they did not document their Curriculum and it remains empty for evaluation of Professor.

For not meeting the minimum requirements indicated in the OR for the consolidation level requested.

Due to internal conflicts between the AB members and those requesting their removal from PRODEP. A similar case is by asking the removal of the AB but by the University. This is common when the results of the AB are not what was planned or expected. An AB requires supervision and institutional management to support its success in terms of the appraisal of its consolidation, managing its creation, maintenance, and evolution. The aforementioned requires

the reviewing of situations, such as the following:

1. Analyze that the workload is feasible for the members of the AB.

2. Verifying that the Knowledge Generation and Application Lines (KGAL) are consistent with the institutional plans and have social relevance.

3. Ensuring that the research projects of the AB are feasible and can be fulfilled, this gave guidelines that they can have projects financed by other institutions and that the resources obtained have a positive impact on the University's infrastructure.

4. Contribution to the quality of both undergraduate and postgraduate educational programs through the FTP that are members of a FABF, ABIC or CAB.

The Academic Bodies in Mexico are the formal research groups recognized by the public education entities such as the Ministry of Public Education (SEP) in the same way by the creator program of the AB, known as the Program for the Professional Development of Teachers (PRODEP). This program annually issues operating rules whose content concentrates the main requirements to evaluate AB and thus be able to change the degree of consolidation.

There are some variables that affect the evolution of the AB, the ideal would be that every 3 years that the AB in Mexico are evaluated, they manage to go from the level of formation to consolidation and finally Consolidated. Inside some Universities there are Academic Bodies (AB) that experience changes and demands, both internal and external, that favor the union of professors with diverse characteristics in terms of the members and collaborators that make them up. In this sense, Siqueiros, Vera and Cruz (2020) inferred that there are institutional

characteristics of the individuals that integrate these groups or of their own academic bodies (AB).

Researchers related to factors associated with the scientific production of AB have found that the academic production of these groups is sometimes not what PRODEP requests or recognizes through the rules of operation, which implies that when the AB are evaluated do not manage to go to the next level or stay in the one they are already evaluated and officially recognized (Durand, 2017). Initially, according to Flores and Surdez (2019), in Mexican universities the efforts to generate knowledge derived from research were individual; over time, it was desirable to create teams for researchers to generate academic products derived from their collaborative work.

The matter is very varied, articles have been written on various aspects such as the problem of AB, teamwork, creation and evolution, knowledge management, human aspects, policies and regulations, evaluation and reviews between the years 2017 and 2022. Therefore, it is necessary to review the literature to learn about different cases in order to study new variables.

Another aspect to consider is that the OR are published on the official page of PRODEP and in the Official Gazette

of the Federation (OGF). Some points of interest may be I.1, I.1.2, I.1.3, I.1.4, to the CAB, where the details of the calls and requirements are specified in full. The amounts for research projects are \$300,000 pesos for FABF, \$212,000.00 pesos for postdoctoral support for ABIC and CAB. However, the foregoing is a guarantee for AB to evolve in their degree of consolidation, so it is necessary to create mechanisms that promote their development and evolution over time.

The AB are part of an institutional macro-indicator known as academic capacity, which is presented below:

The CAB consolidation is measured by dividing the total CAB by the total AB to obtain its percentage as shown below:

$$\% \text{ Consolidation} = \frac{\text{Total CAB}}{\text{Total AB}} * 100$$

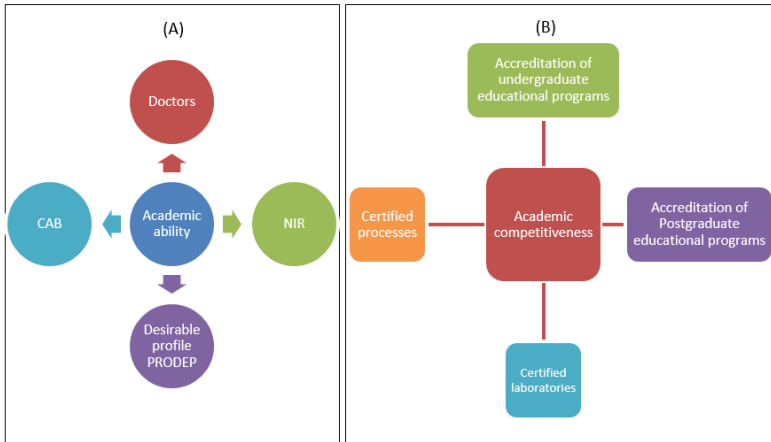
Where:

CAB = Consolidated Academic Bodies

AB = Academic Bodies

There is a difference in Mexico with the indicators of academic capacity and academic competitiveness, mainly because the capacity is focused on certified or accredited people and competitiveness in certified and accredited processes, as can be seen in Figure 1.

Figure 1
Academic ability (A) and academic competitiveness (B)



Source: Own elaboration with data from Prodep.

2. Methodology

The phenomenological qualitative approach was applied, considering that operations can be observed through their self-reference as stated in their methodology (Ayala, 2008). The scope of the research is descriptive, qualitative, cross-sectional, since a characterization of a group was carried out in order to establish its needs and behavior of the AB. A population size of 150 AB, which was randomly sampled with a maximum permissible error of 13% and a confidence level of 95% was taken into account, having a sample size of 23 AB. The PRODEP database, in particular the REGCA module and the page of Academic Bodies recognized by PRODEP (<https://promep.sep.gob.mx/ca1/>) were used.

Additionally, the Google forms tool was employed, and questionnaires were applied to the members of the research groups. In order to speed up the collection

of data automatically and remotely, a bibliometric review was carried out, finding 81 research articles related to academic bodies which served as input to generate comparisons regarding the studies, methods and results obtained. For this task a literature review was carried out from 2008 to 2022. Qualitative and quantitative articles are included. Specifically, 36 studies published in the Scopus, Scielo, Redalyc, Elsevier, Sage, Web of Science, ScienceDirect, Redib, Researchgate and Google scholar databases. A SWOT matrix was also developed to generate proposals that encourage the evolution of indicators that promote the consolidation of these scientific research groups.

3. Dimensions for research promoting in the academic bodies of Oaxaca University

It is common to find a limited strategic alignment in organizations,

which leads to the lack of compliance with the objectives, it is quite a challenge to develop a procedure that allows evaluating the align strategically in companies and that is achieved in practice (Comas et al, 2021)

Fierro, García and Trejo (2020:57), talk about the universities that lead science, technology and innovation to mitigate the consequences that the great social conversions of this century generate in human development, for that reason an interdisciplinary and multidisciplinary approach is required. "Hence, networking and alliances between academic research bodies are necessary to solve problems that concern different communities, beyond their ideologies, interests, and coexistence scenarios".

Some activities of the Professors are exposed by (Barajas, 2021) suggesting that it is important to mention the need to have scenarios that allow achieving the balance of functions and activities of the teachers, it is recommended in the medium and long term, to diversify the educational offer of undergraduate and postgraduate, these substantive functions are mainly tutoring, consulting, thesis supervision and scientific production, that is, the writing of both research and dissemination articles. It is important to highlight that without this information and not operationalizing the variables that affect the AB, uncertainty increases when they are evaluated and when making timely decisions to be favored and not harmed by an administration and management that does not foresee future risks (table 1).

4. Results and discussion

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Table 1
AB consolidation measurement instrument

Variable	Dimension	Indicator	measurement scale
CAB	1. NIR	1. $x > 50\%$	1. AB members
	2. Desirable profile	2. $x = 100\%$	2. AB members
	3. Preferential grade	3. $x = 100\%$	3. AB members
	4. Leadership as a researcher	4. $x > 50\%$	4. AB members
	5. Research networks	5. $x \geq 1$	5. E/3 years/member
	6. Academic production	6. $x \geq 3$	6. E/3 years/member
	7. Doctoral theses	7. $x \geq 1$	7. AB members
	8. Own resources	8. $X \leq 100\%$	8. AB members
	9. Institutional Resources	9. $X \geq 100\%$	9. AB members
	10. External resources	10. $X \geq 100\%$	10. AB members
	11. High academic qualification and institutional commitment of the members of the AB.	11. $X \geq 1$	11. E/3 years/member
	12. Institutional commitment.	12. $X = 100\%$	12. E/3 years/member
	13. Meetings with AB and students.	13. $X \geq 1$	13. E/3 years/AB
ABIC	14. NIR	14. $x \geq 1$	14. AB members
	15. Desirable profile	15. $x \geq 50\%$	15. AB members
	16. Preferential grade	16. $x \geq 50\%$	16. AB members
	17. Leadership as a researcher	17. $x = 1$	17. AB members
	18. Research networks	18. $x = 1$	18. E/3 years/member
	19. Academic production	19. $x = 1$	19. E/3 years/member
	20. Doctoral theses	20. $x = 1$	20. AB members
	21. Own resources	21. $X \leq 100\%$	21. AB members
	22. Institutional Resources	22. $X \geq 100\%$	22. AB members
	23. External resources	23. $X \geq 100\%$	23. AB members
FABF	24. High academic qualification and institutional commitment of the members of the academic body.	24. $X \geq 1$	24. E/3 years/member
	25. Institutional commitment.	25. $X \leq 100\%$	25. E/3 years/member
	26. Meetings with AB and students.	26. $X = 1$	26. E/3 years/AB
	27. NIR	27. $X = 0$	27. AB members
FABF	28. Desirable profile	28. $x \geq 50\%$	28. AB members
	29. Preferential grade	29. $x \geq 1$	29. AB members
	30. Leadership as a researcher	30. $x = 0$	30. AB members
	31. Research networks	31. $x = 0$	31. E/3 years/member
	32. Academic production	32. $x = 1$	32. E/3 years/member
	33. Doctoral theses	33. $x = 0$	33. AB members
	34. Own resources	34. $X \leq 100\%$	34. AB members
	35. Institutional Resources	35. $X \geq 100\%$	35. AB members
	36. External resources	36. $X \geq 100\%$	36. AB members
	37. High academic qualification and institutional commitment of the members of the AB.	37. $X = 1$	37. E/3 years/member
	38. Institutional commitment.	38. $X = 100\%$	38. E/3 years/member
	39. Meetings with AB and students.	39. $X = 0$	39. E/3 years/member

Source: Own elaboration with data from Prodep. In order to carry out a good planning for the evaluation, it is necessary to identify how each requirement is measured.

In table 2 below, it is shown the of institutions that exist in Mexico. subsystems, the number and distribution

Table 2
Number of institutions by each subsystem

Subsystem	Acronym	Number of institutions
Universities public State	LEU	35
Universities public State of Support for Solidary	UPEA	
Institutions Federal	IF	7
Universities Technological	UT	92
Universities polytechnics	UPT	49
institutes Technological Federal	ITEM	98
institutes Technological decentralized	ITD	105
schools normal	IN	130
Universities intercultural	UIC	10

Note: In preparing this table, the information from the fourth quarterly report (PRODEP, 2019) was taken into account

For Siqueiros et al, (2020) the AB of Normal schools have a degree of acceptance and progress that is perceived by the members of their AB, and they consider that they promote research and teaching. While

In the state of Oaxaca there are 6 AB of the Technological Institute of

Oaxaca, 5 FABF and 1 ABIC, while the Benito Juárez Autonomous University of Oaxaca has 35 AB, 16 FABF, 13 ABIC and 6 CAB, the Technological University of the Mixteca has 12 FABF, 5 ABIC and 6 CAB, recognized by PRODEP in 2021.

Table 3
Academic bodies in the state of Oaxaca in 2021

Academic bodies in the state of Oaxaca in 2021				
HEIs	FABF	ABIC	CAB	Total AB
Technological Institute of Oaxaca	5	1	0	6
Technological Institute of the Valley of Oaxaca	1	2	1	4
Technological University of the Central Valleys of Oaxaca	3	1	0	4
Benito Juarez Autonomous University of Oaxaca	16	13	6	35
Technological University of the Mixteca	12	5	6	23
University of the Sea	13	5	1	19

Cont... Table 3

University of the Istmo	6	4	0	10
University of Papaloapan	16	4	2	22
University of the Sierra South	14	2	0	16
University of the Sierra Juarez	3	1	1	5
University of Ravine	5	1	0	6
Total	94	39	17	150

Note. Own elaboration with data from Prodep.

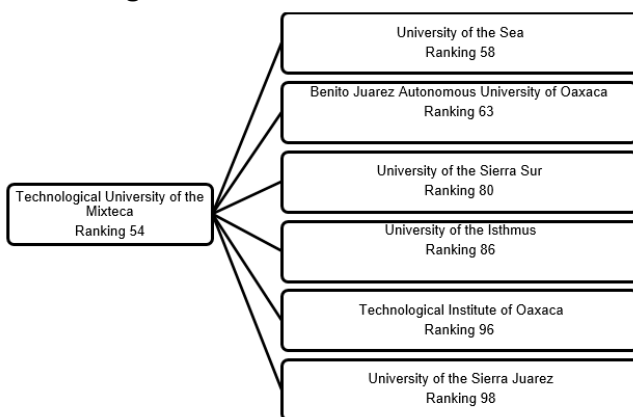
There are works such as the one by Viancos (2020) whose objective was to analyze the constitution of the Maximum Collegiate Bodies (MCC) of Latin American universities, in order to create a typology that would facilitate their ordering based on the greater or lesser participation of the Interest Groups (IG), which, as in this work, use the Scimago database for research purposes.

This type of institution ranking exercise has been established since

the 1980s as a commercial means of higher education. These exercises have received serious methodological criticism, specially due to their scope and ability to describe the particularities of the participating universities (Ordorika, 2015).

Research ranking in the state of Oaxaca, according to Scimago 2020, the HEIs and their position in the country according to their production are presented in figure 2.

Figure 2
Ranking of research in the state of Oaxaca



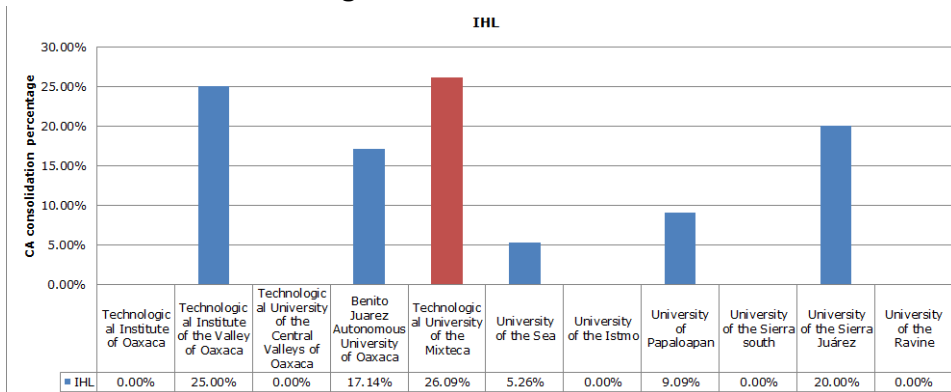
Note: Own elaboration with data from https://www.scimagoir.com/pdfs/SIR_lber_2020.pdf
Consultation page <https://promep.sep.gob.mx/ca1/index.php?RELOAD=0> dated August 4, 2021.

5. Strategies that boost the consolidation of academic corps in the technological University of the Mixteca

In this case, the Technological University of Mixteca has the highest

consolidation indicator, for this reason it will be taken as a case study to analyze its context and propose strategies that further boost the percentage of consolidation.

Figure 3
Percentage of consolidation of the AB



Note: Own elaboration with data from https://www.scimagoir.com/pdfs/SIR_Iber_2020.pdf

The AB can be affected as soon as their members are unaware of the current Operating Rules, ignorance can lead them to a path where their consolidation is slow and the planned objectives are not achieved. To a large extent it can be due to internal communication and how the information is disseminated, the foregoing is subject to the Subsystem to which the Affiliated University belongs, and in turn its AB or research groups will be governed by the rules and requirements applicable to said subsystem.

Beltrán (2018) mentions that to belong to an academic group, an affective work affiliation is required, in the sense of sharing the interests of the group and describes that teamwork is significant. However, even if the above characteristics exist, it is not a guarantee that the AB advances in its consolidation because it is governed by an evaluation in which affinity or personal interests are not considered, which implies an objective, non-subjective evaluation.

One of the challenges is to identify and regulate activities for FTP in such

a way that those who belong to a AB do not have problems, Villarruel (2021) points out “determine the distribution of activities and institutional functions of teachers full-time”. Other authors such as Ocampo-Gómez et al, (2020) refer to the substantive functions of a researcher who performs various functions, in which he can enrich the processes and results of a University.

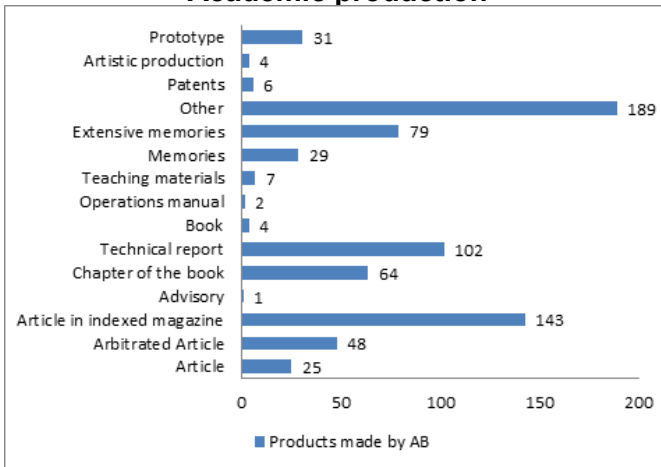
Taking into consideration the previous data of the total of the FTP belonging to a AB, where is analyzed the information the module REGCA in the pulled apart of information curriculum staff, with the objective of analyzing the maximum degree of studies of each one of the FTP belonging to a AB, since one of the requirements indicated in the OR 2019 mentions that the majority of the members must count with the preferred doctorate degree. Analyzing the data and taking into account above information which can be said that of the 98 FTP, 64 referring to 65% have a doctorate as the maximum degree of study, then there is a master's degree with 31 FTP representing 32%, however subtracting 3% with 3 FTP that as they only have a bachelor's degree as the maximum degree of study.

In the case of the revised UPEA in the state of Oaxaca, 65.4% hold a

doctorate, while 31.6% have a master's degree and 3.0% have a bachelor's degree. Academic degree of the FTP attached to a AB.

Another of the requirements established in the OR 2019 indicates that the majority of the members have recognition of the desirable profile, understanding this as: FTP that satisfactorily fulfill university functions and give evidence of the above, at least in the three last years. It refers to the teacher who, according to the characteristics and orientation of each subsystem, has a higher level of academic and/or technological qualification than the programs educational that the professor imparts who has the degree academic preferential either minimum and perform of form balanced activities of teaching; generation either extension innovative of knowledge, applied research or technological development, assimilation, development and transfer of technologies or research educational innovative; tutorials and management academic bonding; knowing this doing a research in the module REGCA that of the 98 FTP belonging a AB 66 representing the 67% bill with the profile desirable while that the 33% remaining with 32 teachers who do not have it. Within the work academic can find the following products.

Figure 4
Academic production

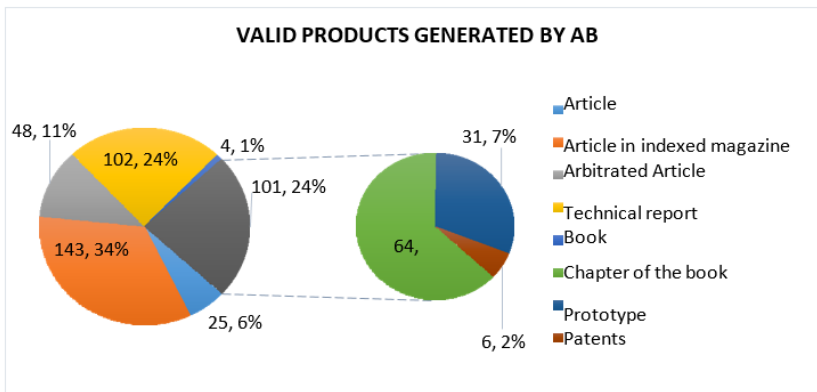


Note: Products registered what production academic by the AB of the TUM.

However, quality in production is of the utmost importance, according to the OR 2019, the analysis of agreement a validated products generated by the worked collegiate of the AB is performed.

In the Figure 5 observe only the products valid and generated by the AB, which the total of 734 products only 423 are accepted by PRODEP, meaning 57.6% of the total.

Figure 5
Valid products generated by AB



Note. Products valid by the OR 2019 generated by the AB.

Source: Cantarinez et al, 2020.

In this regard, Surdez et al, (2017) see the problem of role performance from the shortcomings in public policies and mention that the indicators and guidelines are confusing for researchers, while Viancos & Ganga (2020) refers to evaluation bodies in Mexico and their policies to which professors have to align, these in turn have an increasingly important presence in terms of their similar distribution between men and women and their participation in research in academic bodies (López-Molina & Vázquez-Guerrero, 2018).

In the logistics of the AB, in the management of supply, it gives rise to the purchase of all equipment necessary for the elaboration of the academic production, which until now the members have the ease of make their purchases with the suppliers that are most convenient for them so that they can meet their demands and thus be able to meet their objectives, with the amount of \$200,000.00 pesos as a limit to spend complying with the Law of acquisitions of the state of Oaxaca.

Once the internal and external analysis of the AB was carried out, the weighting of the Comprehensive Institutional Strengthening Program (PIFI) used in SUNE0 was resumed, and thus to evaluate the aspects identified and investigated previously in each of the words of the acronym in the SWOT.

Regarding the verification and validity related to the content of the questionnaire and the SWOT, an evaluation of the content of the questionnaire was carried out through the judgment of experts and administrative personnel in charge of managing institutional indicators. The assessment of this type is understood as "the degree





to which a measurement instrument measures what it really intends to measure or serves the purpose for which it has been built" (Martín, 2004: 27), for him that the items for the development of the measurement instrument are indicators of what is intended to be measured; the experts' assessment of the items is qualitative, since it judges its ability to evaluate the dimensions to be measured.

According to Cabero and Llorente (2013) expert judgment is the appropriate strategy to evaluate a questionnaire because it has the advantage of obtaining extensive and detailed information about the object of study and the quality of the answers that are going to be obtained. This technique is correct from a methodological point of view and constitutes an indicator of content validity of the data collection instrument (Escobar and Cuervo, 2008). Therefore, it is immediately presented how all the detected factors are evaluated in the SWOT.

Speaking of quality in higher education, there are universities that are certified and can use diagnostic instruments such as annex B of the ISO 18091 standard, Guidelines for the application of the ISO 9001: 2015 standard, based on the standard being an international reference applied to minimize the gaps found due to poor management or ignorance of the AB leaders in charge of administration (Camacho et al, 2022).

Next, Table 4 shows the aforementioned weightings, it should be noted that for the SWOT matrix, a rating above 3 is considered a strength and a rating of 0 to 2 is considered a weakness.

Table 4
Weighting of the Comprehensive Institutional Strengthening Program


Color	Qualification	Criterion
	0	It has nothing.
	1	Do you have any documents?
	2	If you have some documents.
	3	It has mostly and no improvements have been made.
	4	It has all the documents with improvements.

Source: self made.

However, in order to carry out the weighting of the PESTEL section of the SWOT matrix, only two criteria of the PIFI weighting were taken up again, as shown in Table 5, considering an

opportunity when there is evidence of benefits for the AB and a threat when there is no evidence of benefits that contribute to the AB.

Table 5
Weighting for the criteria of the PESTEL section of the SWOT matrix

Color	Qualification	Criterion
	0	There is nothing.
	4	There is evidence of the opportunities available.

Source: self made.

Results of the AB of the TUM

Below are the general results of the surveys applied to the members of the AB of the TUM according to the cologram, with the clarification that the green and yellow colors represent strength, the orange color an intermediate or preventive point and white and red weakness, the average of the variables is found at the end of table 6 and weighting according to the cologram and

is as follows:

OR= 2 (what is considered as previously stated is a preventive variable)

IFCAB = 1.65 (it is weakness as a qualifying criterion regarding knowledge of them)

EP= 1.3 (it is even lower and is considered weakness)

IE=0 (undoubtedly the value is even lower projects a total ignorance of it)

Table 6
Analysis of the study variables in the TUM

HEIs	#	AB Name	Degree of consolidation	registration year	OR	IFCAB	EP	IE
TUM	1	Networks and Distributed Systems	ABIC	2002	1	0	0	0
	2	Chemical Biological Sciences	CAB	2004	4	4	2	0
	3	Multidisciplinary Integration	FABF	2006	1	0	0	0
	4	Applied Optics	FABF	2006	3	2	1	0
	5	Automation And Control Mechatronic Systems	CAB	2007	3	3	1	0
	6	Administration, Culture and Economic Development (CAA-CYDE)	CAB	2009	4	3	3	0
	7	Science and Technology Food	ABIC	2009	3	2	2	0
	8	Systems Modeling And Analysis Social: Urban and Cultural	FABF	2009	1	1	1	0
	9	Pattern Recognition	FABF	2010	1	1	1	0
	10	Mathematical Modeling and Topology	CAB	2011	4	4	2	0
	11	Economy, Society and Taxation	ABIC	2013	3	3	3	0
	12	Industrial Engineering and Environment	ABIC	2015	4	2	2	0
	13	Mining and Processes	FABF	2016	1	1	1	0
	14	Mathematical analysis	FABF	2016	1	1	1	0
	15	Advanced Materials Study	FABF	2016	1	1	1	0
	16	Functional Materials Engineering	FABF	2016	1	1	1	0
	17	Regional Design and Development	FABF	2017	1	1	1	0
	18	Comprehensive Water Management	FABF	2018	1	1	1	0
	19	Industrial Process Optimization	FABF	2018	1	1	1	0
	20	Development of Electromechanical Systems	FABF	2018	1	1	1	0
	Total				2	1.65	1.3	0

Source: self made.

In the case of the TUM, one of the strategies used by other HEIs is the decision to terminate the AB that are not achieving the evolution in consolidation, with this the Total CAB indicator among the total AB of the HEI is improved. However, planning is required to make all these adjustments and improve the

indicators, but it is not the solution to the root problem, it is a way of making up the unsatisfactory numbers, the ideal is to work with the variables in question to the degree of achieving their domain of each of them, taking into account that they are the requirements that PRODEP evaluates.

In the case of Hurtado et al, (2020) They analyzed the leadership for the consolidation of academic bodies in Mexican public universities, and ensure that identifying the factors of leadership effectiveness that strengthen the consolidation of AB in Mexican public universities, will allow an objective description of the type or types of leadership required for the innovative application of knowledge and the achievement of expected results.

When we talk about strategies, their application can be really extensive, as well as the sources draw on, for

example, that employ them in Mexico, (Lavado et al, 2022) the use of strategies and the SWOT, mentioning their relevance both for the diagnosis as well as for the evaluation developing strategies, the combination of methods and other tools can result in new strengths for organizations or in positive transformations.

Ore et al, (2022); Calanchez et al, (2022), they show that it is feasible to be successful when using innovation in strategies, and even in times of pandemic.

Table 7
SWOT Analysis

Analysis	Strengths	weaknesses
Management	FA1 100% of the AB have planning regarding their consolidation.	D A1 The AB have minimal participation with other AB.
Marketing	There are events of the institutes that are broadcast by the AB.	DM1 65% of AB do not have a marketing or neuromarketing program.
Operation	FO1 100% of AB know that the less KGAL the more feasible it is to achieve consolidation.	D01 36.84% of the KGAL of the CAs are not aligned to the State Development Plan.
Finance	FF1 The AB have an accounting department in charge of managing the economic resources.	DF1 AB only gets the 13.76% of strengthening supports.
Humans	FH1 65.3% of FTP have the preferred degree: doctorate.	DH1 73.4% of the FTP of the AB do not have NIR.
Information	FI1 There are AB control and administration modules.	DI1 There are 4 information systems that must be documented, which implies spending a lot of time filling them out.
Technological	FT1 100% of AB have access to workshops and laboratories.	DT1 Scarcity in the development of patents.

Cont... Table 7

	Opportunities	threats
Politicians	OP1 Public policy supports AB in Mexico.	AP1 Changes in the operating rules that affect the AB.
Economic	SO1 Align not only with federal funds, but also with state policy that supports research.	AE1 Reduction of resources for programs that support HEIs and their AB.
Social	OS1 AB are recognized by the Ministry of Public Education and are considered important by the Government of Mexico.	AS1 Delays in research due to the social effects of COVID-19.
Technologies	OT1 Acquisitions of state-of-the-art equipment through AB projects.	AT1 Oaxaca is in 32nd place in the ranking of Science and Technology and Innovation 2018.
ecological	SO1 There are calls for extraordinary funds to be used by the AB.	AE1 Natural resources, in reduction or scarcity and increasing costs.
competitive	OC1 AB can be evaluated every 3 years to change the degree of consolidation.	AC1 According to technological advances, the obsolescence of equipment in Oaxaca is high to be able to compete nationally and internationally.

Note. Own elaboration.

6. Conclusions

In the year 2022 there is papers that complements information, methods, tools, instruments, theories, databases, information and communication technologies, with broader real-time and historical data, so that the CAB indicator can be analyzed and various solutions proposed different problems that arise in each of the states of the Mexican Republic with their HEIs and their AB.

It is concluded that there are still areas of opportunity for the AB to consolidate, such as the development of faculties to work as a team and greater participation of those involved in the design of policies related to the activities of the AB. At the end of the research work, the following answers are reached, the generation of strategy proposals for HEIs, affects the consolidation of the AB

of TUM and its administration. there is a relationship between the ignorance of the operating rules and the evolution of the TUM AB that affects their performance, the AB have a greater lag when they have weaknesses compared to the OR, otherwise the CAB demonstrated strengths compared to the OR in this HEI.

There is a relationship between the lack of knowledge of the invariable features of CAB and their evolution. There is a relationship between the ignorance of the evaluation instruments for the CAB and the evolution of the AB, in this case 100% of the members of the AB of TUM do not know it and its consolidation is not regular every three years according to what is expected as academic results.

There is also a relationship between the lack of knowledge of

Strategic Planning and the consolidation of the AB of TUM. Therefore, it can be concluded that the OR, IFCAB, SP and EI variables, being a weakness, affect the consolidation of the TUM AB, so it is necessary to measure and analyze them in the universities that have AB, and generate action plans to improve the impacts caused by the aforementioned variables.

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