Swot Analysis and Consolidation of Research Groups at Public Universities in Mexico the Case of the State of Oaxaca

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Abstract

This study aims to analyze the requirements of Consolidated Academic Bodies (CAC) recognized by the Program for Faculty Improvement (PRODEP) in order to generate proposals through Strategic Planning (SP) that benefit the Academic Bodies (AB) affiliated with the ten Institutions of Higher Education (IHE) belonging to the Subsystem of Public Universities with Solidarity Support in Oaxaca (UPEAS). The data analyzed correspond to two years of evaluation, gathering information from the three levels of AB: in formation (CAEF), in consolidation (CAEC), and consolidated (CAC), with the purpose of characterization. The methodology used involved data collection through a questionnaire, compiling 144 surveys from Full-Time Professors (FTP) who are members of CAEF, 49 surveys from FTP who are members of CAEC, and 19 surveys from FTP who are members of CAC, totaling 212 respondents at the UPEAS level. Hierarchical, distance, and similarity methods were selected based on the obtained results for the study. It is important to note that, being a cluster, the UPEAS requires a special statistical method. It comprises ten IHE and seventeen campuses, housing 92 AB with 205 LGAC in the first year and 103 AB with 209 LGAC in the second year, necessitating the application of three questionnaires for each level of consolidation of the AB. All professors belonging to an AB who completed the questionnaire and its various question blocks were subjected to cluster analysis, followed by a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) and proposal of strategies.

Keywords: *Education; strategies;SWOT; planning.*

1. Introduction

The importance of this work lies in the analysis of the requirements of Consolidated Academic Bodies (CAC) recognized by the Program for Faculty Improvement (PRODEP) in State Public Universities with Solidarity Support in the state of Oaxaca, which we will refer to as hereafter as UPEAS. UPEAS require the implementation of a SWOT analysis to generate proposals through Strategic Planning (SP) that, when applied, benefit Academic Bodies (CA) in their measurement indicators. Guzmán (2023) and Espinal (2020) suggest that there is a gap between the progress of the academic sector and propose reducing it by defining a quality educational model for public universities in Mexico, as it is necessary to involve all stakeholders with a holistic vision. Therefore, it is relevant to emphasize the need for management and technical tools or methods related to strategy for HEIs.

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It is important to mention that the evolution of CA is fundamental for Higher Education Institutions (HEIs) as it is linked to other indicators such as Academic Capacity and Academic Competitiveness, which are related to the level of qualification of Full-Time Professors (FTPs) and the degree of quality of Educational Programs (EP), and CAs are attached to EPs and, in turn, to Higher Education Departments (HEDs), and HEDs to HEIs, implying an impact on more institutional indicators. Palomares et al. (2020) present a strategy to strengthen the academic staff through the formation of Academic Bodies in a Faculty, with an emphasis on

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planning, collaborative work, and relevance, which provides evidence that they can benefit in terms of economic resources as they are impacted by considering certain government dynamics such as the allocation of Results-Based Budgets (RBB) and Results Indicator Matrices (RIM). However, the research derived from CA is reflected in the Curricula and Study Programs, so research of this kind serves as a foundation for other institutions, especially newly established ones, which lack planning or documented support to provide initiatives to contribute to all the aforementioned indicators.

The analysis by (Salinas et al., 2015; Vences et al., 2022) and studies by (Palomares et al., 2014; Dimas et al., 2014; Montemayor et al., 2014; Palomares et al., 2016) and other contributions such as those by Hernández et al., (2022) demonstrate that there are leaders among professors of educational programs who belong to a CA, indicating an interest in improving education and its educational programs through research. It is also necessary to motivate and increase the number of professors with PRODEP profile and encourage participation for their entry into the National System of Researchers (SNI). These actions promote the consolidation of CAs by actively participating in such programs as well as in cooperation and research networks at the national and international levels.

There are various theoretical perspectives that explore the knowledge-based approach, considered by many as emerging. One of the most prominent is the resource-based theory (Hernández, 2010). One of the resources with the greatest strategic importance for HEIs is knowledge because it resides within the individual (tacit knowledge); it is not directly appropriable, its transfer is only possible through its application in productive activity; it is difficult to transfer and replicate. A function considered as activity for CAs is management, and it can be evidenced that professors perform it effectively in works such as those of Neri Guzmán (2023) and Valdivia et al., (2020), analyzing entrepreneurship in Mexican Public Universities, identifying a shortage of documentation, examining 25 variables in 95 articles from SCOPUS (2002-2018), highlighting the relationship between variables and offering guidelines to strengthen university entrepreneurship, which is itself a management activity recognized by PRODEP.

2. Methodology

Hierarchical Methods, Distances, and Similarities were selected for the case in question, with the clarification that being a Cluster, authors like (Castro Heredia et al., 2012; Zaenchkovski & Kirillova, 2019; Domíngez-Gómez, 2022; Chambi Condori, 2023) applied similar methods to conduct research in large geographic areas where they had data and variables of interest that they wanted to compare but were distant. In this case, a special statistical method is required as it is a university system comprising ten universities and seventeen campuses, which in turn have 92 CA with 205 LGAC, requiring the application of three questionnaires according to the consolidation level of the CAs, and finally all professors belonging to a CA who would answer

the questionnaire and its different blocks of questions, requiring a cluster analysis, followed by the application of SWOT analysis. Stratified sampling was employed to consider each campus, similar to the methodology of Pérez et al., (2015, p. 108).

In this research work, the variables are not numerical; the responses are open-ended, closed-ended, and multiple-choice, for which ANOVA is not recommended. Data standardization was performed to calculate distances in the case of responses. For data retrieval, instrument validation is not required in this situation because the cluster method works differently and thus does not require instrument validation.

Cluster analysis has been used as an analytical and structured method to detect homogeneous strategic groups. It is a multivariate statistical method that allows classifying HEIs into clusters with similar characteristics. It is a statistical technique used in various disciplines when the objective is subject classification. This technique allows understanding the characteristics, the degree of importance, and the statistical significance of clusters (Stock & Zacarías, 2011), and enables the inclusion of multiple variables, allowing potentially rich descriptions (Ketchen & Shook, 1996).

Yurén et al., (2015) and Low & Egan (2024) identify academic interactions involving socialization, which have positive or negative impacts on academic bodies when generating strategies, and Harzing (2000) applied it to empirically test and expand Bartlett and Ghoshal's typology of multinational corporations. Beyond traditional clustering approaches, other different techniques for segmentation have been proposed, such as "fuzzy cluster," "quality threshold clustering," and "latent cluster." Despite its strengths, cluster analysis has been criticized for depending on researchers' decisions. Avagimyan et al., (2023) conducted similar work but in multicultural educational environments, being similar to this case as they involve different regions and people from various cities, municipalities, and towns.

Euclidean Distances. Hierarchical methods start from a matrix of distances or similarities between the elements of the sample and construct a hierarchy based on a distance. If all variables are continuous, the most commonly used distance is the Euclidean distance between standardized variables. It is not generally recommended to use Mahalanobis distances, as the only covariance matrix available is that of the entire sample, which may show very different correlations than those that exist between variables within groups. The position of the groups generates a strong positive correlation in the set of points, which disappears if we consider each of the groups separately.

To decide whether to standardize variables before analysis, it is advisable to consider the above comments and the study's objective. If we do not standardize, the Euclidean distance will depend mostly on variables with larger values, and the analysis result may change completely when modifying their measurement scale. If we standardize, we are giving a similar weight to the variables a priori, regardless of their original variability, which may not always be appropriate.

When the sample contains both continuous variables and attributes, the problem becomes more complicated. Suppose variable x_1 is binary. The Euclidean distance between two elements of the sample based on this variable is $(x_{i1} - x_{h1})^2$, which takes the value zero if $x_{i1} = x_{h1}$, meaning when the attribute is present or absent in both elements, and one if the attribute is present in one element and absent in the other. However, the distance between two elements corresponding to a standardized continuous variable, $(x_{i1} - x_{h1})^2 / s_1^2$, can be much larger than one, meaning continuous variables generally weigh much more than binary ones. This may be acceptable in many cases, but when, due to the nature of the problem, this situation is undesirable, the solution is to work with similarities.

SWOT Analysis (FODA in Spanish). Once the internal and external analysis of the CA has been performed, the weighting of the Institutional Strengthening Integral Program (PIFI) used in UPEAS was revisited to evaluate the aspects identified and researched previously in each of the words of the acronym. Regarding the verification and validity related to the content of the questionnaire and the SWOT analysis, an evaluation of the questionnaire content was conducted through expert judgment and administrative personnel responsible for managing institutional indicators. Such an evaluation is understood as "the degree to which a measuring instrument measures what it intends to measure or serves the purpose for which it was constructed" (Martín, 2004). The items for constructing the measurement instrument are indicators of what is intended to be measured; the experts' assessment of the items is qualitative because it judges the instrument's ability to evaluate the dimensions to be measured.

According to Cabero and Llorente (2013), expert judgment is the appropriate strategy for evaluating a questionnaire because it has the advantage of obtaining extensive and detailed information about the object of study and the quality of the responses to be obtained. This technique is correct from a methodological standpoint and constitutes an indicator of the content validity of the data collection instrument (Escobar and Cuervo, 2008). Therefore, the following presents how all detected factors are evaluated in the SWOT analysis.

Tabla 1:1 Ponderación del Programa Integral del Fortalecimiento Institucional.

Color	Calificación	Criterio
	0	No tiene nada.
	1	Tiene algún documento.
	2	Si tiene algunos documentos.
	3	Tiene en su mayoría y no le han hecho mejoras.
	4	Tiene todos los documentos con mejoras.

Fuente: Vázquez et al 2022.

However, to be able to perform the weighting of the PESTEL section of the SWOT matrix, only two criteria from the PIFI weighting were considered, as shown in Table 2.

Considering an opportunity when there is evidence of benefits for the CAs and a threat when nothing is found to contribute to the CAs.

Tabla 22: Ponderación Para Los Criterios del Apartado PESTEL de la Matriz FODA.

Color	Calificación	Criterio
	0	No se tiene nada.
	4	Existe evidencia de las oportunidades que se tienen.

Fuente: Vázquez et al 2022.

The technique used in this research work was the questionnaire. A total of 144 surveys were compiled from FTPs who are members of CAEF, 49 surveys from FTPs who are members of CAEC, and 19 surveys from FTPs who are members of CAC, totaling 212 respondents at the UPEAS level. These questionnaires were formulated by experts in the field, including the institutional representative (RIP), to formulate each of the questionnaires. In this case, three questionnaires were developed, one for each level of CA consolidation. The questionnaire for CAEF consists of 13 questions, the questionnaire for CAEC has 33 questions, and the questionnaire for CAC consists of 64 questions. It should be clarified that originally the maximum number of questions was 75, but the questions not considered for this research are because they contain personal data, so they are omitted. However, for statistical analysis purposes, they were numerically added as placeholders to maintain the original question

numbering. For example, question four was not considered for the study because it contained personal data, but statistically it was included only to maintain the order of the questions. However, during analysis, they were discarded since it was known that those questions contained personal data. RStudio software was used, considering its free and user-friendly nature with various operating systems.

Self-administered questionnaires sent by mail, as mentioned by Argimón (2004), have several advantages such as low cost, absence of interviewer influence, access to people living at great distances, and ease of response when the respondent has an opportune moment. Among the disadvantages are the possible lack of representativeness of the sample, low response rate, and uncertainty about the identity of the respondent.

The type of questions used for this work was open-ended and closed-ended. According to Delgado (2003), the responses that the respondent can provide can be categorized as follows: Closed-ended: Those that pre-specify the possible alternative responses (e.g., "What is your current marital status? Single, married, widowed, separated, or divorced").

Generally, they present exhaustive and mutually exclusive categories, although depending on the nature of what is being studied, the respondent may sometimes select more than one option if necessary. According to Armigon (2004), in the case of open-ended questions, they are not pre-established, and each interviewee responds in their own words. For example: "What is your current marital status?" These questions provide information, but their subsequent coding can pose significant difficulties. It is also common to combine both options (open and closed), presenting questions with a range of responses accompanied by an open item when not all response options are certain to be covered.

Limitations of questionnaires, according to Armigon (2004), it must have an identification number but should not contain personal identification of the subject, i.e., it must be anonymous. Questionnaires provide "soft" information as opposed to the "hard" information from observation. Additionally, they provide statements, not measurements. The responses do not necessarily reflect reality but rather the interviewee's perception of it. The interviewer is essential; they need great technique and preparation for this purpose. They must behave neutrally and not express agreement or surprise. The telescope bias may appear: distant episodes are referred to as if they happened recently. They are used frequently. It is always advisable to try to use existing instruments of proven accuracy and reliability.

Data collection is a very important process during research, in this case through the method of content analysis, whose general purpose was to collect non-obstructive information, a contribution of great utility by Eugene Webb in 1966, a method that serves to study human behavior and fits perfectly for the case of CA, since practically a CA is a group of professors, according to Hernández et al. (2010), and is very useful for indirect measurements.

In this particular case, the information was obtained from the official PRODEP website in the CA recognized by PRODEP section, so the reliability and validity of the data contained in the research are based on being official documents and data whose results are obtained through the use of methodologies developed and tested worldwide, by organizations such as the OECD, to mention one emblematic example, and that the information is supplied through the portal of (PRODEP, 2018).

From the above, secondary digital documents related to the research sample were reviewed, consisting of 92 CA from the universities that make up the UPEAS, totaling ten HEIs in total in the first year and 103 CA in the second year with the same number of HEIs, all belonging to the state of Oaxaca, taking into account their degree of consolidation. According to Castro

et al. (2022), in the educational field, the number of research and innovation documents grows exponentially over time. This trend reflects the consolidation of the discipline as an area of study in constant evolution, the number of LGAC, number of members according to Moriña and Orozco (2022). Team collaboration is more effective as they have to explain or

By teaching something to others, an individual's understanding of the concepts is enhanced.

The significance of this initial result lies in the fact that only 18 CA were known to exist in IES 1. In order to gauge the scope of the research, it was necessary to investigate the entire universe at the UPEAS level. The information was obtained by filtering the databases of the PRODEP system from the first year analyzed, as presented in Table 3: Summary of CA in UPEAS.

Tabla 3: Resumen de CA, LGAC y CA Consolidados del UPEAS Primer Año.

#	IES	Año de constitución	# de CA	# de Líneas de investigación	CA Consolidados
1	IES 1	1990	18	33	2
2	IES 2	1992	18	60	1
3	IES 3	2002	11	28	0
4	IES 4	2002	20	33	1
5	IES 5	2003	11	24	1
6	IES 6	2005	7	14	1
7	IES 7	2006	7	13	0
8	IES 8	2009	0	0	0
9	IES 9	2013	0	0	0
10	IES 10	2013	0	0	0
Total:			92	205	6

Fuente: Elaboración Propia Con Datos De PRODEP.

In the previous table, it can be observed that on average, there are 92 CA in the UPEAS. The CA have more than 200% in terms of CA compared to their LGAC, and only 6.52% of the total CA population have the CAC degree, which is a significant reason to seek improvement in this indicator of academic capacity at the UPEAS level. For this reason, the CA of the UPEAS will be surveyed.

In Table 4, it can be observed that on average, there are 103 CA in the UPEAS. The CA have more than 200% in terms of CA compared to their LGAC, and only 11.65% of the total CA population have the CAC degree. There is a noticeable positive impact compared to the CACs of the second year analyzed, doubling the percentage. However, there is still much work to be done. This result is achieved by promoting the dissemination of RO, RICAC, PE, and sharing the evaluation instrument for the CA.

Tabla 4:4 Resumen de CA, LGAC y CA Consolidados del UPEAS Segudo Año.

#	IES	Año de constitución	# deCA	# de Líneas deinvestigación	CAConsolidados
1	IES 1	1990	20	37	4
2	IES 2	1992	20	64	2
3	IES 3	2002	11	28	0
4	IES 4	2002	20	33	1
5	IES 5	2003	14	30	4
6	IES 6	2005	9	18	1
7	IES 7	2006	9	17	0
8	IES 8	2009	0	0	0
9	IES 9	2013	0	0	0
10	IES 10	2013	0	0	0
Total:			103	209	12

Fuente: Elaboración Propia Con Datos de PRODEP.

When observing the competencies that teachers must have, it can be confirmed with the work of Viñoles et al. (2022) who applied the PRISMA methodology and analyzed an initial sample of 322 documents, selecting 20 for detailed analysis. The results highlight the influence of the strategies studied on professional competence and technological integration in education, which can be considered to formulate strategies for CA. Additionally, other authors such as Currin & Gulahmad (2020) suggest that it is crucial for all these methodological strategies to be based on active learning, which allows instruction to focus on learning and empower teachers who belong to a CA and impact educational processes.

This is the current situation of the CA of the UPEAS. In Graph 2, the IES of the UPEAS do not have a proportional amount according to their year of creation, so a phenomenon occurred regarding the maintenance and increase of CA. This happens because the CA are evaluated every three years, and if they do not meet the requirements of the evaluations according to the current RO after 9 years of maintaining the same level, they can be discontinued by PRODEP. Another situation that occurs is that there is not enough dissemination of CA calls in the IES, along with cases where the PTCs show no interest in forming a new CA and do not belong to a CA. This happens with more than 70% of the PTCs in the UPEAS.

Results: Derived from the previous results of all the IES belonging to the UPEAS, it is expected to have countless new questions. For example, what to do? While there are positive results from some IES, others affect the final outcome considering that an average is taken for each variable, and this affects the trajectory of other IES. Unfortunately, being a system, all must be taken into account, and none can be excluded despite their problems or seniority.

One can appreciate that by using cluster analysis, responses of interest were grouped for analysis, and to study the results more deeply. There is a belief that consolidation only occurs through writing JCR-quality articles and having SNI, in the case of professors, which is actually false. Their impacts are strong, speaking at the state, societal, and scientific community levels. An example of the importance of each variable is presented below:

RO = If one does not have mastery of the RO, they are unaware of the benefits that can be obtained and the way to obtain them, resulting in economic losses by not taking advantage of financial opportunities.

RICAC = Affects the quality of education provided by the IES. This point is profound because it reflects on our society and the future of Mexican youth.

PE = If one is not aligned with the PED, pertinence is lacking, and this implies a lower possibility of accessing extraordinary resources.

IE = As an analogy, one can take the example of taking the CENEVAL exam without a study guide, studying what is considered important but not necessarily what will be evaluated. That's how important this instrument is.

There is a trend that can be observed in the table, which is that as the IES of the UPEAS are older, they tend to have mastery of the variables compared to younger IES. This thesis work is very pertinent and offers opportunities with openness to constructive criticism.

From a positive perspective, these results are good because they can be improved with topics such as PE, training, and countless opportunities that are worth exploring. At the moment, it can be concluded that the results either do not trend towards weakness but can be turned into strengths. Refer to Table 5 for observation.

Tabla 5: Análisis de las Variables de Estudio en las UPEAS.

No.	IES	CA en el año 1	CA en el año 2	CAC en el Año1	CAC en elAño 2	Año de registro	R. O.	R I C A C	P E	IE
1	IES 1	18	20	2	4	1990	2	1.65	1.3	0
2	IES 2	18	20	1	2	1992	0.06	1.18	1.35	0
3	IES 3	11	11	0	0	2002	2	1.3	1.6	0
4	IES 4	20	20	1	1	2002	2	1.65	1.6	0
5	IES 5	11	14	1	4	2003	3.08	2.15	1.62	0
6	IES 6	7	9	1	1	2005	2.5	0	1.25	0
7	IES 7	7	9	0	0	2006	2.17	0	2.00	0
8	IES 8	0	0	0	0	2009	0	0	0	0
9	IES 9	0	0	0	0	2013	0	0	0	0
10	IES 10	0	0	0	0	2013	0	0	0	0
	Total	92	103	6	12	--------	1.38	0.79	1.07	0

Fuente: Elaboración Propia.

Below is the SWOT Matrix of the Academic Bodies (CA) in the context of the University of the Region of the State of Oaxaca (UPEAS). This matrix provides a detailed overview of the strengths, opportunities, weaknesses, and threats faced by the CA in their process of consolidation and development. Through a comprehensive evaluation of different aspects, this matrix seeks to identify areas for improvement and potential strategies to strengthen the academic and scientific capacity of the CA in the region. The SWOT analysis conducted offers a comprehensive perspective that can serve as a starting point for the formulation of policies and actions aimed at improving the competitiveness and quality of research in the higher education institutions of the UPEAS. Please refer to Table 6.

Tabla 6: Matriz FODA de los CA del UPEAS.

AMOFHIT						
	Fortalezas	Calif.		Debilidades		Calif.
F1AO1	Organización, cuentan los CA con una estructura, responsable del CA y responsable de la LGAC.	3	D1AP1	Planeación, los CA no tienen un plan estratégico, el PDI no lo desarrollan todas las IES del UPEAS.		1
F2AI1	Integración, es fácil incorporarse a un CA, es por afinidad, cada año se realizan cambios en las convocatorias de altas y bajas de PRODEP.	3	D2AC1	Control, la consolidación y la creación de nuevos CA es irregular en todas las IES analizadas.		1
F3AD1	Dirección, se cuenta con directores de instituto y ellos gestionan a sus CA, estos a su vez se alinean a la Misión y Visión de su instituto.	4	D3MS1	Producto o Servicio, no los tienen definidos todos los CA de las IES.		0
F4MP1	Precio, se tienen calculados se pueden vender.	3	D4MP1	Plaza, los CA no tienen espacios de difusión ni venta.		1
F5OP1	Productividad, producen más los PTC que son integrantes de un CA, cada año se les invita a los PTC que no forman parte de un CA a crear un CA nuevo o a integrarse a uno ya existente.	3	D5MP1	Promoción, no se cuenta con difusión para los CA.		0
F6FF1	Financiamiento, constante cada año se reciben apoyos por PRODEP, CONAHCyT y PIFI, a través de los proyectos de los CA.	3	D6OC1	Calidad, solicitudes rechazadas ante PRODEP y PIFI.		2
F6FF1	Financiamiento, constante cada año se reciben apoyos por PRODEP, CONAHCyT y PIFI, a través de los proyectos de los CA.	3	D6OC1	Calidad, solicitudes rechazadas ante PRODEP y PIFI.		2
F7FC1	Sin problemas de comprobación, se tiene procedimientos para ejercer recursos, el departamento de financieros apoya y hace reuniones informativas.	3	D7OA1	Gestión de abasto, no se tiene el 100 de proveedores por contrato.		2
F8HF1	Formación profesional, todos los profesores son PTC en la planta docente, esto cumple con las RO de PRODEP Y PIFI.	4	D8OP1	Gestión de Producción, no es constante en el caso de los CA.		2
F9HA1	Área disciplinar de desempeño, los PTC cumplen este requisito.	3	D9OD1	Gestión de Distribución: más del 70% de los CA no distribuyen sus productos.		2
F10IM1	Módulos de control externo, FPI y REGCA de PRODEP.	3	D10FF1	Problemas financieros, existen adeudos con PRODEP.		2
F11TI1	Investigación, se cuenta con talleres y laboratorios.	3	D11FC1	Problemas de comprobación, devoluciones a la TESOFE, por ejercer erróneamente.		2
			D12HC1	Capacitación, incipiente, en las RO, RICAC, IE y PE, en todas las IES del UPEAS.		1
			D13IS1	Sistema de control interno, módulos del UPEAS.		1
			D14TD1	Desarrollo, escasez de patentes, PRODEP apoya solo con el 50% del costo de la patente, el otro 50% se tiene que gestionar.		1
			F15TD1	Dependiente de tecnología, poca producción de prototipos		1
			F16TI1	Independiente de tecnología, casi todo se compra hecho, en el caso de los equipos en promedio tienen 15 años de haber sido adquiridos.		1

Fuente: Elaboración Propia.

Table 7 provides a detailed continuation of the SWOT (Strengths, Weaknesses, Opportunities, and Threats) Matrix of the Academic Bodies (CA) at the University of the Region of the State of Oaxaca (UPEAS). In this table, the opportunities and threats identified through the PESTEC analysis (Political, Economic, Social, Technological, Ecological, and Cultural) are presented, offering a comprehensive view of the external factors that impact the evolution and consolidation of CA in the institution.

Tabla 7: Continuación de la Matriz FODA de los CA del UPEAS.

	PESTEC				
	Oportunidades	Calif.		Amenazas	Calif.
O1PG1	Políticas Gubernamentales Legales, que apoyan a las IES.	4	A1PR1	Reforma laboral, no beneficia a toda la población de los PTC.	0
O2PP1	Política pública, que apoya los CA.	4	A2PT1	Tratados comerciales, encarecen los productos utilizados por los CA.	0
O3PL1	Legislación tributaria, sigue sin afectar a los CA.	4	A3EP1	Presupuesto Federal, con recortes presupuestarios para la investigación.	0
O4EF1	Económicas Financieras, aprovechar otros fondos extraordinarios y del extranjero.	4	A4EP1	Presupuesto Estatal, con recortes presupuestarios para la educación.	0
O5EP1	Presupuesto Internacional, para redes de investigación.	4	A5SD1	Distribución de ingresos, el presupuesto del UPEAS tiene déficit.	0
O6SS1	Sociales Culturales, es aceptada la investigación de los CA.	4	A6SF1	Factores sindicales, posibilidad de creación de sindicatos para los PTC.	0
O7SE1	Estilo de vida de los investigadores, estable sin conflictos.	4	A7TT1	Tecnológicas Tendencias y situaciones competitivas, poca adquisiciones en los últimos 5 años.	0
O8SE1	Estratos demográficos, existen CA en todo el país y a nivel internacional.	4	A8TT1	Taza de obsolescencia, en aumento promedio 15 años.	0
O9TT1	Transferencia tecnológica, a través de los CA.	4	A9TP1	Protección intelectual, que se deje de apoyar económicamente por los fondos extraordinarios.	0
O10TA1	Adquisiciones de vanguardia por año, son una alternativa a través de proyectos de los CA.	4	A10EL1	Limitaciones, reducción de pruebas por contaminación.	0
O11EE1	Ecológicas Ambientales, existen LGAC relacionadas al tema y con pertinencia social.	4	A11ER1	Recursos naturales, en reducción o escasez.	0
O12EN1	Normatividad, sigue beneficiando a la investigación de los CA, las RO cambian poco y las convocatorias siguen abriéndose cada año.	4	A12CC1	Cultura Organizacional de clase mundial, resistencia al cambio por parte de los PTC.	0
O13CC1	Competitivos Organizaciones, aprovechar las redes de investigación.	4			
O14CL1	Líder en el mercado, se puede competir.	4			
O15CE1	Exceso de competencia, crear nuevas LGAC.	4			
O16CT1	Top ten en el mercado, se puede escalar para llegar al Top ten, en promedio en seis años.	4			

Fuente: Elaboración Propia.

The leaders of the CA demonstrate educational leadership. Tintoré and Gairín (2022) affirm that research has been growing and evolving in both quantity and quality for over a decade. Jara et al., (2023) analyzed the relationship between school leadership and the development of citizenship competencies, indicating the social relevance of CA and their importance in encouraging teachers who work alone to join a CA to contribute to consolidation and educational quality.

When analyzing SWOT strategies, scenarios can be created as proposed by Ruiz et al., (2023), where they indicate that disparities in accreditations by area can influence the development and

leadership of research lines. The absence of accredited professors in certain areas could weaken them and compromise their continuity by lacking academic leaders who are usually found within CA. Research studies such as those by Moreno et al., (2021) and Barba-Martín (2019) identified academic production and its diversification, and also their importance, as is the case for CA, which is why it is considered in the SWOT matrix.

Conclusions

After a thorough analysis of Academic Bodies (CA) within the framework of the Comprehensive Institutional Strengthening Program (PIFI) and the Program for the Improvement of Teaching Staff (PRODEP) at the University of the Region of the State of Oaxaca (UPEAS), a series of fundamental conclusions are derived. According to the results obtained in the research, it is concluded that there are areas of opportunity to provide research that contributes information, methods, tools, theories, databases, information and communication technologies, with real-time and broader historical data, so that the CAC indicator can be analyzed and various solutions proposed to the different problems that arise in each of the states of the Mexican Republic with their HEIs and their CA, with a long-term objective to make the academic competitiveness indicator particularly dynamic, especially in the CAC indicator, and in turn, to try to ensure its continuity and not to fall into the disappearance of CA, due to lack of information or confusion, and even due to demotivation of CA members. The current situation and prospects for improvement of CA in Higher Education Institutions (HEIs) in the region have many opportunities for improvement.

The study reveals a marked disparity between different HEIs in terms of the strength and consolidation of their CA. For example, HEIs 1 and HEIs 2 stand out as the institutions with the highest number of consolidated CA, indicating significant strength in their academic and scientific structure. These institutions have probably implemented effective research management and promotion strategies that have contributed to their prominent position. On the other hand, HEIs 3, HEIs 7, and HEIs 8 show a lower consolidation of CA, suggesting an urgent need to strengthen their academic and scientific management strategies to improve their competitiveness at the national and international levels. A key finding is the influence of knowledge about operating rules, evaluation instruments, and strategic planning in the evolution and consolidation of CA. The lack of understanding or adequate implementation of these elements can have a negative impact on the effectiveness and performance of CA, especially in HEIs with weaknesses in these areas. It is imperative that these institutions adopt a more proactive and strategic approach to address these deficiencies and strengthen their academic and scientific competitiveness.

Furthermore, the importance of generating relevant and pertinent research that contributes to improving educational and scientific quality in the region is emphasized. CA, especially in weaker HEIs, can play a crucial role in this regard, acting as engines of innovation and academic excellence. It is essential that efforts be made to promote collaboration among researchers, encourage thematic diversification of research, and ensure adequate institutional support for the development and consolidation of CA. With a focus on continuous improvement and academic excellence, CA can play a fundamental role in the transformation and development of HEIs in the State of Oaxaca region.

The promotion of a strong research culture and the fostering of inter-institutional collaboration are essential to maximize the impact of scientific and academic production in the region.

Another relevant aspect is the need to promote greater participation and commitment of professors in Academic Bodies (CA). There is a significant percentage of professors who are not affiliated with any CA, representing a missed opportunity to strengthen research and innovation in Higher Education Institutions (HEIs). It is essential to implement effective awareness and motivation strategies to involve more professors in research activities and promote a culture of collaboration and academic excellence throughout the university community. The study provides a detailed overview of the situation of CA in HEIs of the UPEAS and highlights specific areas that require attention and improvement. It is crucial for institutions and stakeholders to work together to implement effective policies and strategies that strengthen CA and promote academic and scientific excellence in the region. Only through joint and coordinated efforts can the challenges be overcome and the full potential of CA as drivers of development and progress in higher education in the Oaxaca region be fully realized.

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