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Experiments in Total Quality Management at the Autonomous University of Chihuahua's School of Animal Husbandry. A Case Study

Experiencias en la gestión hacia la calidad total. Un estudio de caso de la Facultad de Zootecnia de la Universidad Autónoma de Chihuahua

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Abstract

Presented here are experiments and results obtained by the School of Animal Husbandry of the Autonomous University of Chihuahua (UACH), Mexico, after implementing a quality-management system. The methodology was based on a process of strategic planning, with the use of models for the quality of official state, national, and international organizations. There was improvement in the performance of 25 indicators related with teaching, research, extension and administrative activities. It was concluded that by strategically focusing the management of the upper-level agricultural educational institutions concerning quality, their processes and results were improved, and that this is compatible with institutional development.

Key words: Operational evaluation, educational quality, educational planning.

Resumen

Se presentan experiencias y resultados que obtuvo la Facultad de Zootecnia de la Universidad Autónoma de Chihuahua (México), después de implementar un sistema de gestión de calidad. La metodología se basó en un proceso de planeación estratégica con el uso de modelos para la calidad de organismos oficiales estatales, nacionales e internacionales. Se mejoró el desempeño de 25 indicadores relacionados con actividades docentes, de investigación, extensión y administración. Se concluye que al enfocar estratégicamente la gestión de las instituciones de educación agrícola superior hacia la calidad, se mejoran sus procesos y resultados, lo cual es compatible con el desarrollo institucional.

Palabras clave: Evaluación operacional, calidad educativa, planeación educativa.

Introduction

The achievement of a quality education, with coverage and equity among social groups, and between rural and urban areas, is still a wish and a promise in the countries of Latin America. The exchange of innovative experiences in educational management and the implementation of policies and models that tend to reduce the gaps through innovative systems for evaluating processes and education agents, represent useful strategies for improving or ensuring quality in the field of higher education.

In the context of Mexican education during the past 20 years, evaluation has been an important element of public policy, closely linked to the concept of quality in education.

Evaluation is envisioned as an indispensible activity, and comes before any action leading to the elevation of educational quality. The evaluation thus formulated constitutes a stage in the planning, understood as a rational action endowed with purpose, and is the final stage of the natural process of knowledge which concludes with the emission of informed judgments (De la Garza, 2005).

The Mexican educational system has recognized the importance of higher education in achieving sustainable levels of human development. This has been repeatedly stated in various official documents such as national and state development plans, and national and state higher-education programs.

International bodies like the United Nations Educational, Scientific and Cultural Organization (UNESCO); the World Bank (WB); the Inter-American Development Bank (IDB); the Organisation for Economic Co-operation and Development (OECD); and the Organization of Ibero-American States for Education (OEI)* have conducted studies and issued specialized documents giving test results and specific recommendations for higher education in the world, in Latin America, and particularly in Mexico.

Concern for evaluating the quality of higher education emerged in Latin America and the Caribbean in the context of the economic crisis that characterized the last decade. There are also those who say that the current crisis in higher education, which could be described as a time of expansion, is mostly about quality, and the basic challenge in this beginning stage of the century, is to make a substantial improvement (Tunnerman, 2003).

The panorama of Mexican higher education also contains important opportunities. One of these is the power for convening, the consensus and the strategic vision of the National Association of Universities and Institutions of Higher Education (ANUIES), composed of the top 123 institutions in Mexico. After 50 years of existence, ANUIES has consolidated its peer institutions, and has recently been able to generate a vision for the higher education system for the year 2020 (Loera, 2000).

Inspired by the vision for 2020, the National Education Program 2001-2006 indicates that good quality involves evaluation, which is conceived as an indispensable means of continuous improvement, quality assurance and accountability. In addition to evaluating, it is essential to disseminate the results, and to use them in making decisions. The evaluation process and its results should be recognized as valuable assets that would help schools and institutions assess their achievements and limitations, as well as define and operate innovations that would enable them to achieve higher levels of development and consolidation.

In agreement with the Inter-institutional Committees for the Evaluation of Higher Education (CIEES), the Mexican Agricultural Association of Higher Education, A.C. (AMEAS) decided to launch a specialized agency to promote, evaluate and ensure the quality and development of the country's agricultural education. Thus was founded the Mexican Committee for the Accreditation of Agricultural Education, A. C. (COMEAA), a body which was duly recognized by the AMEAS in November of

* For ease of reference, where the names of organizations have been translated from the Spanish, their acronyms have usually been retained as given in that language. In the case of international organizations which have commonly-used acronyms in English, those acronyms have been used.

2001, and by the Mexican Council for the Accreditation of Higher Education, A. C. (COPAES) in August of 2002 (COMEAA, 2004).

Patton (1990), points out that even so, selecting the most appropriate method of evaluation is not an easy task. At present, evaluators should be careful in trying to link research methods with the nuances of the questions and situations to be assessed, the peculiarities of specific situations of the program, and the need for information required by those who have requested and supported the evaluation.

Methodology

The experiences of an agricultural institution of higher education were analyzed through case studies. This methodology is considered to be an ideal means of answering the questions of *how* and *why* it is successful in innovation processes. These, according to Yin (1984), are some of the fields where case studies are used: politics, political science, research on public administration, community psychology and sociology, and organizational management studies.

The design of case studies is useful for giving a deeper understanding of the situation, and of its meaning for those involved (Merriam, 1998). The abundance of detail which can be obtained allows a complete understanding of the object of study. Furthermore, all evaluation studies are considered to be case studies (Stake, 1999).

The case study as a methodological tool satisfies the three parts of a qualitative method: it is descriptive, knowable and explanatory. In addition, one can have multiple perspectives of analysis when considering the various actors involved in the process. This tool has been used by institutions such as the Manchester Business School, the University of Manchester; the Centre for Research in Innovation Management, the University of Brighton; the Institute for Research in Innovation Management at the University of Klel; and the COTEC Foundation for Technological Innovation, among others (Solly 2004).

In the case of the School of Animal Husbandry at the Autonomous University of Chihuahua (UACH), in order to plan and implement a quality management system, since 2000 there have been used the models of quality of the CIEES, of the Chihuahua Quality Improvement Award (PCHMC), of the Inter-institutional Postgraduate Enrichment Program (PIFOP) of the National Council for Science and Technology (CONACYT); that of the COMEAA; and in 2004, that of the Ibero-American Council of Honor for Excellence in Educational (CIHCE).

The use of these models has been powered by the need to validate the usefulness of the frames of reference of organizations whose objective is to promote productivity and quality processes in state, national and international environments. Of the models applied, in Latin America there were not many documented cases which can be consulted so as to use them as references in other organizations—which is the purpose of this study.

The experiences and results obtained are important for providing certainty in the making of decisions in the School of Animal Husbandry itself, as well as for supporting the processes of other mid-level and higher-level institutions, and of social and nonprofit organizations which may benefit from the implementation of processes similar to this analysis. As a result, they will help to build a knowledge base for the successful management of agricultural education in developing countries.

The case study was conducted twelve months after the conclusion of the 2000-2004 school year, in order to find a schematic that would document and disseminate the experiences, mainly in areas suitable for policy management in higher education. To structure this, we chose as the format the chronological narrative of events, because it allows the reader a descriptive overview of the gradualism and evolution of the process—important elements from which were derived some of the recommendations.

In a first stage, there was carried out a bibliographical review, with which were identified the elements of a case study, as well as the processes, events and results to be presented in the unit analyzed. In keeping with its qualitative character, the case study was adopted according to the characteristics highlighted by Merriam (1998):

a) The qualitative study is based on the perspective of the reality constructed by people involved with their social worlds.
b) It is an effort to understand unique situations as part of a particular situation and its interactions.
c) The basic concern is to understand the phenomenon from the perspective of the actors and not from that of the researcher.
d) It usually involves field research.
e) It uses inductive research strategies.
f) It is richly descriptive, since it focuses on processes, feelings and knowledge.

The foregoing applies to a recent phenomenon in exploring and describing how a public organization of higher education implemented the quality-management process.

The information presented was obtained through direct participation. The person in charge of the presentation of the case study served as Planning Secretary and Quality Process Director from beginning to end of the present case. The information was obtained through participative observation, interviews with the heads of the various fundamental and procedural areas of the institution, review of files, relevant documents and reports from various administrative offices, whose transcript was made for the purpose of submitting annual reports to the Board of Trustees and semester reports to the Administration.

To enrich the process of reviewing the information, and with it the triangulation required by the method, documents from entities outside the organization were

reviewed. Groups representative of graduates from the institution's various academic programs were directly consulted, so as to go beyond the official discourse in the reports, since the alumni were directly involved.

The information selected was evaluated and analyzed; this information constitutes the knowledge base for developing, in a narrative format, the experiences obtained in the organization. This structure permits a detailed description of the phenomena observed, and an explanation of ongoing processes, highlighting in the report the system of indicators used to measure the annual advancement and to evaluate with the directors, the results obtained. As noted by Barzelay and Cortazar (2004), this is not the only way to deal with the study of such practices, but we believe that within the set of qualitative methods developed by social sciences, it makes more efficient the creation, presentation and evidence analysis for management practices.

Also in the opinion of these authors, in the narrative method, the episode, understood as the set of events under study, is composed of a set of events whose development and succession is the only thing the researcher wants to explain. For this, s/he needs to resort to the context in which the process took place. S/he is not interested in explaining the context, but rather the episode—the events which, although they are not part of the episode, had a significant influence on it or were influenced by it. These might be previous events, contemporary happenings, those related to it, and subsequent events influenced by the episode, but occurring after it took place.

Finally, we analyzed the information obtained for each of the episodes, through classification, extraction, reduction and verification, with the identification of the experiences and highlighting the results obtained by the Autonomous University of Chihuahua's School of Animal Husbandry when there was implemented a quality-management system. The criteria for categorization was the thematic content, considering the findings obtained through observation, interviews, reported activities and events that occurred. The quantitative data collected and analyzed were used to corroborate and support the qualitative data integrated into the case study, and found to be the most useful for understanding the phenomenon of innovative management experienced during the administrative management.

Context

The School of Animal Husbandry is one of the 15 academic units of the Autonomous University of Chihuahua (UACH). It was founded in 1957, and is located in the city of Chihuahua, capital of the state bearing the same name in northern Mexico. It offers the programs Zootechnical Engineering in Production Systems, Ecological Engineering, a master's degree in Applied Statistics, a master's degree in Science, and a PhD in Animal Production Science. The faculty is made up of 90 teachers, of which 80% are male and 88% are married. Their average age is 45 years, and they have been at the UACH from 18 to 20 years.

Seventy-five percent have a B.S. in Zootechnical Engineering; 35% have doctorates and 62% have master's degrees. Eighty-nine percent got their B.S. at the UACH, as did 45% of those with postgraduate degrees. Ninety-three percent are full-time employees, 34% present the profile of the Faculty Improvement Programme (PROMEP), and 70% have succeeded in obtaining a scholarship for academic performance.

Procedure

The quality process began with the self-evaluation of the School of Animal Husbandry, followed by the external evaluation developed by the Agricultural Sciences Committee (CEC) of the CIEES and by the process of administrative submission-reception. The B.S. programs (Ecology and Animal Husbandry), the M.S. program and the doctorate in Animal Production, as well as the research program were evaluated both by faculty of the school and by the committees of peers from the CIEES. The latter gave an evaluation report with 109 recommendations, which were incorporated into the Comprehensive Development and Enrichment Plan 2000-2004 (PLANDEFI) (Autonomous University of Chihuahua, School of Animal Husbandry [UACH-FZ], 2000).

To implement administrative management during the period 2000-2004, six models were applied. The first was that of Strategic Planning (SP) known in the School of Animal Husbandry as the "Strategic Analysis Model for the Organizational Planning of the UACH (ANESPO-UACH)", which is based on the strategic analysis of graduate programs (see Figure 1), and on five models oriented toward quality management. All together, they make up the Quality Management System in the UACH School of Animal Husbandry in 2000-2004 (MGC-FZ-UACH) (Figure 2).

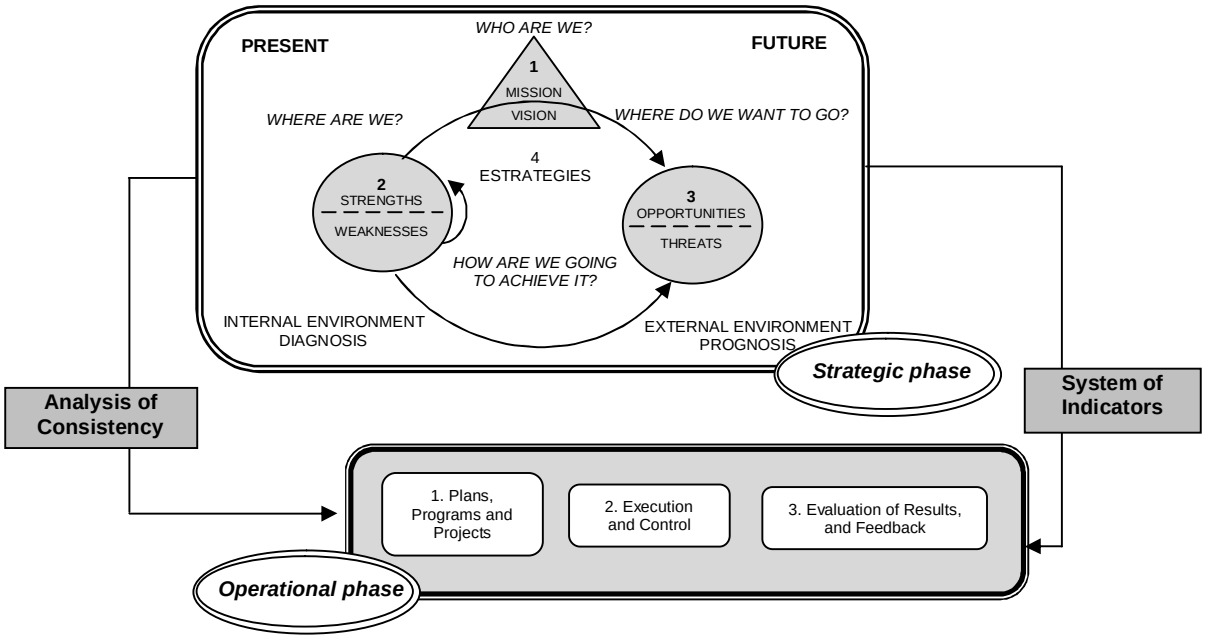

Figure 1. Strategic Analysis Model for the Organizational Planning of the UACH (ANESPA-UACH)

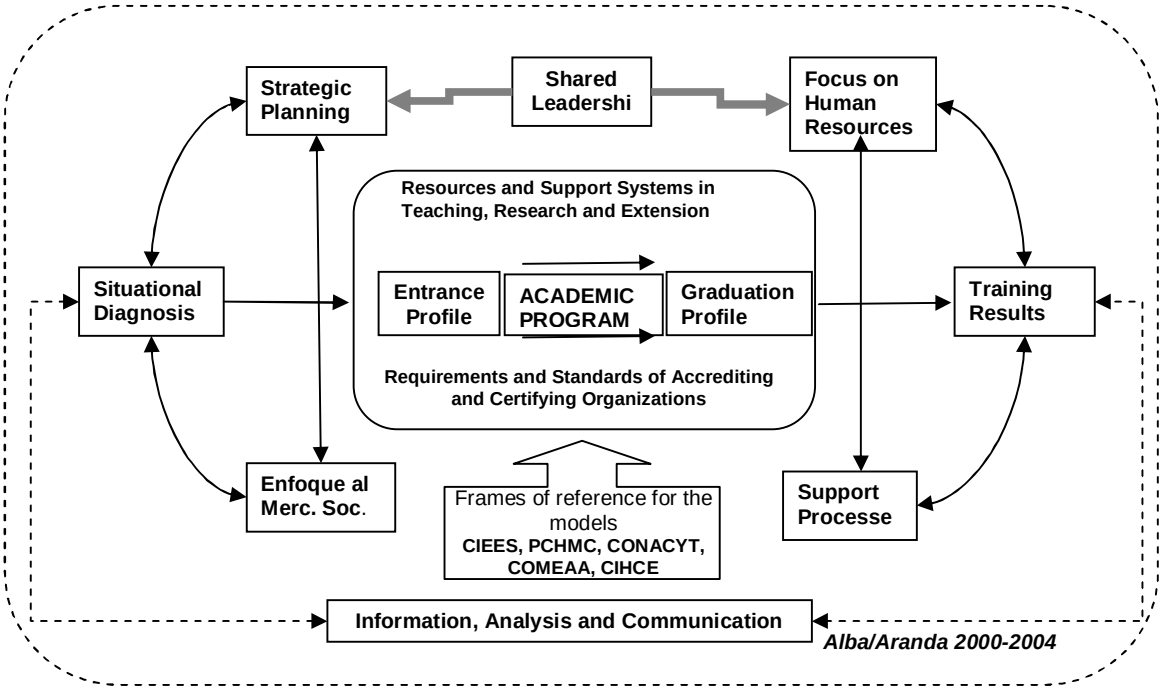

Figure 2. Quality Management System in the UACH (SGC FZ UACH) School of Animal Husbandry from 2000 to 2004

In December 2000, three months into the new administration, there was presented to the faculty the results of the CCA-CIEES evaluation, the Comprehensive Development and Enrichment Plan 2000-2004 (UACH-FZ, 2000), and a report of activities for the first 90 days of work. In the plan there were established eight strategic programs with 18 goals. The programs were: 1) total quality, accreditation of programs and certification of administration; 2) academic development; 3) Fortification of research and technological development, 4) Extension and bonding; 5) Human Development; 6) Financial resources; 7) Productive infrastructure; 8) Planning and evaluation.

As part of the strategies proposed, in January of 2001, the School of Animal Husbandry was entered in the contest for the "Chihuahua Quality-Improvement Award (PCHMC). For follow-up, there were formed a quality council and four work teams, one for each of these functions: education, outreach, documentation and auditing. The teams were directed by the academic, extension, planning and postgraduate secretaries, respectively. The responsibility of each team was to comply with the recommendations of the peer reviewers of the CCA-CIEES, and of the PCHMC external evaluators.

At the same time, attendance at the annual meetings of the AMEAS and the monitoring of the COMEAA creation initiative began, through the training of teachers and their active participation as evaluators in peer committees.

In August of 2002, the master's degree programs and the Doctorate in Animal Production performed their self-evaluation, and the university proposed them to the Institutional Program for Postgraduate Enrichment (PIFOP) of the CONACYT, as candidates for membership in the National Program for Excellence in Postgraduate Studies (PNP.)

Before submitting the *Second Annual Activities Report* (UACH-FZ, 2002), there was made a self-evaluation of the Comprehensive Plan for Development and Enrichment (UACH-FZ, 2000), based on the achievement of the objectives of the eight strategic programs (see Table I).

Table I. Advances made as of September, 2002

Strategic program	General average	Weighted average
Total Quality and Certification	60 (.10)	6.00
Academic Development	68 (.25)	17.00
Advancement of Research	80 (.20)	16.00
Extension and Liaison	42 (.15)	6.30
Human Development	83 (.05)	4.15
Financial Resources	100 (.05)	5.00
Infrastructure	54 (.10)	5.40
Planning and Evaluation	100 (.10)	10.00
Totals	86 (1.00)	70.0

To reinforce performance and identify deficiencies in strategic programs, an outside consultant was hired; the consultant's diagnosis revealed significant progress, but also pointed out the following needs (PCS Services of Organizational Development, 2003):

- Develop of maturity in the leadership of the administration of the School of Animal Husbandry and the participatory planning processes at the level of the secretariats;
- Improve approaches to human-resource management;
- Overcome the lack of a training program based on the detection of training needs;
- Create programs of awareness, personal development and academic development;
- Provide spaces for camaraderie, where the staff can get to know one another;
- Improve the system for evaluating teachers' performance;
- Promote greater communication and formalization of meetings for problem-solving;
- Make educational regulations better known.
- Work toward greater integration of the *escolarizado* and *semiescolarizado* systems**.

** In Mexico, the escolarizado ("schooled") systems are those of the ordinary undergraduate programs, while the semiescolarizado ("semi-schooled") systems are designed for faculty members who have experience in teaching, but lack a diploma. Through these programs, teachers can obtain their degrees while continuing to exercise their profession. This translator proudly obtained her B.A. degree in the Autonomous University of Baja California's first such program, which included Cambridge University's course "Certificate for Overseas Teachers of English" (cote), taught by an instructor provided by the British Council in Mexico.

- Develop recognition and positioning strategies for administrative and research functions.

In March 2003 a workshop was held in preparation for the evaluation. Three months later the COMEAA carried out an evaluation for the accreditation of the undergraduate academic programs. The verdict was delivered three months later, with favorable results.

In late 2003, there was received an invitation from the CIHC to participate in the competition for the Ibero-American Award for Excellence in Education 2004. To take part in this process, there was prepared a comprehensive report which was submitted in January of 2004. In March, the school was notified that it had been one of the winners; to receive the award, a university committee and the consultant attended the international ceremony held in Lima, Peru, in April of 2004. The results of this experiment were presented a week later at the XXXIV National Meeting of AMEAS Directors held in Guadalajara, Jalisco (Mexico).

Six months before the end of the administration's term of office, there was held the Second Alumni Forum, an event used to triangulate the results as required by the case study. Evaluated from that perspective was the performance of the administration through the application of a survey of 10 questions developed to assess the vision, mission and values, and to make note of the suggestions relating to organizational improvement.

Results

One of the recommendations received from the COMEAA *peer committees* was to establish a monitoring and evaluation system based on indicators that would reveal the behavior of the variables (Table II).

Table II. System of Indicators of the PLANDEFI 2000-2004*

Indicator	2001	2002	2003	2004
Total number of undergraduate students	389	403	446	517
Total number of postgraduate students	85	100	111	128
Quality index, teaching personnel (scale of 1 a 5)	2.46	3.05	3.16	3.40
Index of academic absences (% teacher absences)	18	8	6	5
Level of scholastic performance (grade averages, 1 a 10)	74	78	79	80
Index of student satisfaction (scale of 1 a 5).	3.2	4.0	4.2	4.3
Number of theses published	17	23	21	20
Number of teachers who participated in conferences	29	36	55	40
Number of projects with external funding	31	28	28	35
Number of research results published	32	39	53	40
Number of students who completed their required social service	75	44	48	45
Number of extension service actions carried out	48	209	167	158
Number of active collaboration agreements	20	22	24	24
Number of technical services carried out	359	374	390	325
Number of teachers in events of self-improvement	33	55	84	52
Number of teachers in training	5	10	12	16
Percentage of administrative personnel in training	90	48	55	62
Annual cost per student for the Animal Husbandry program**	32	27	28	23
Annual cost per student for the Ecology program**	14	18	18	17
Annual cost per student for the postgraduate programs**	53	39	32	27
Number of student scholarships granted	ND	ND	125	203
Total of Financial Income (millions of pesos)	5.72	6.91	7.20	6.85
Percentage of use of the installed physical capacity	ND	80	85	87
Number of participatory planning exercises conducted	2	3	3	3
Number of external recognitions received	0	2	2	2

*Source: Autonomous University of Chihuahua, School of Animal Husbandry (2000, 2001, 2002, 2003, 2004).

**Indicator in thousands of pesos, calculated on the basis of the costs related to the salaries received by teachers, administrative staff of the school, and incidental expenses.

By grouping indicators, important differences can be observed between the *before* (2001) and the *after* of the quality process (2004). There is notable a 35% average increase in the school population. The quality indicators improved approximately 15%, research productivity, reactivation and response in the activities of extension and liaison. The activities of training personnel and teachers were increased, and an increased number of persons received grants and scholarships. Moreover, the infrastructure worked at 87% of its capacity, and there was a 20% increase in average revenue of a financial nature, and a 40% decrease estimated in costs per student.

In regard to management by quality—the guiding principle of the process—outstanding are the external recognitions received during the period of administrative management. In May of 2001, the official notification of Level 1 consolidation was received; this was assigned by the CIEES to undergraduate and postgraduate educational programs, and these programs were declared *accredited in the short term.*

In January of 2002 the School of Animal Husbandry was the winner of the "Chihuahua Award for Quality Improvement", in the category of Education, awarded by the Chihuahua Center for Quality and Productivity, A. C. Subsequently, in September of that year, the master's degree and doctoral programs of Animal Production were accepted into the PIFOP of the CONACYT as candidates for membership in the National Program of Excellence in Graduate Studies.

In May of 2003 there was received the verdict of accreditation from 2003 to 2008 for educational programs of Zootechnical Engineering in Production Systems and Ecological Engineering, issued by the COMEAA for achieving more than 90% of the required criteria. This placed the school among the first agricultural institutions to be accredited on a national level.

Follow-up studies of postgraduate alumni 1999-2003, of the School of Animal Husbandry (Autonomous University of Chihuahua, Department of Extension and Cultural Outreach, 2003) produced the following data:

- More of 80% of the graduates had received their degrees.***
- More of 90% of the students' average scores were above 9.0.****
- Seventy-five percent of students obtained a degree within a year after graduating.
- National and international recognition.
- Sixty percent of the graduates showed 100% fulfillment of their training expectations
- High levels of employment, improved employment and economic status.
- 70% are still doing research and publishing results.

In April of 2004, the Ibero-American Council of Honor for Excellence in Education (CIHC), awarded the institution the 2004 Award for Excellence, for the indicators presented and demonstrated in advancement achieved during the last three years. This award included a trophy, an entry in the book *Excellence in Education*, the award of an *honoris causa* doctorate to the university's highest authority, and a degree of "Master of Educational Management" awarded to each member of the work team. Subsequently, in April of 2004, the AMEAS presented the School of Animal Husbandry with a national recognition in the XXXIV National Meeting of Directors, for having achieved the high distinction of the CIHC.

Aranda, Pérez, and Méndez (2006) reported that during the second alumni forum in March of 2004, there was conducted a methodological triangulation; the results were:

*** In Mexico, the conferring of the degree is not simultaneous with, nor identical to graduation, but is a separate event, with further requirements.

**** Grades in Mexico are expressed as 1 – 10, rather than as 1 – 100.

- One hundred twenty-two surveys were administered, covering 51% of those attending the forum.
- Seventy-two percent were males.
- Sixty-three percent were graduated in Animal Husbandry, 26% in Ecology, and 15% in postgraduate work.
- Seventy-seven percent of the graduates were above 35 years of age.
- Thirty percent had been graduated less than 10 years ago, and 83% had received their degrees.
- For all the questions of the survey there was clear trend toward a value of *good* to *very good*.

The aspect that needs improvement is the diversification of the academic offering, of the lines of research and the services offered to the community.

Overall performance received an average grade of 85%. Scoring higher were the performance of alumni, those under 35 years of age, those who were graduated between 21 and 30 years ago, those with degrees, those who had been graduated from postgraduate courses, and those who work outside the university. Outstanding in the results of the information obtained, the classification with the highest value is for *infrastructure and equipment*, while those with the lowest scores are the lack of *information about the academic offer* and *professional recognition.*

Discussion

The use of SP focused on models of administrative management geared to the continuous improvement of quality facilitates operational administration in organizations, gives the actors in the educational process a comprehensive view of what is desired to be achieved—management under a QMS. This is feasible to implement in IEAS, permits the improvement their performance indices, and allows them to meet the expectations of internal and external stakeholders.

The frames of reference of the CIEES, PCHMC, PIFOP, CIHC COMEAA were found to be compatible with the implementation of the organization's institutional development. Its implementation in a CMS in higher education can be used in an evolutionary and chronological manner within the institutional, state, national and international settings.

The results obtained in the QMS in the various programs to support functions (foundational and procedural) were positive in all the cases.

The commitment of administrators to the process, the teamwork, participatory policies, the rapid and effective internal communication, the training of the institution's staff, and the persistence in the process were key internal factors in obtaining successful results.

In the external environment, the existence of policies to improve and ensure quality, recognized programs and institutions with knowledge of the processes, external evaluation agencies, accreditation organizations, and financial support for obtaining funds were key factors in success.

It is essential to establish from the beginning of the process, a comprehensive system of monitoring indicators for a clear, timely, regular and systematic evaluation of institutional performance.

The results indicate that it is necessary that the quality management programs implemented continue to be carried out in order to be revitalized, and so as to consolidate in the long run, a culture of excellence in the institution.

Case studies and triangulation allow the description and analysis of organizational situations that guide the processes of evaluation, generate hypotheses for further study, compare and complement the information contributed by other research, and acquire knowledge about the reasons and strategies developed by institutions to improve their performance.

The processes of strategic planning, of quality management, of evaluation, and of qualitative and quantitative research should be used more specifically to study, analyze and document the developmental phenomena of educational institutions at all levels.

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