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# The Entropy as an Invisible Barrier in University Management

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***Abstract***

*In university educational management, entropy emerges as a key concept for understanding organizational dynamics and its impact on educational quality. This qualitative research was conducted under grounded theory and phenomenology. The central objective was to analyze the perceptions of university authorities regarding the entropy generated in the licensing process. The key participants were ten individuals with experience in university management, teaching, and who had experienced the licensing process. The results indicated thirty-eight (38) emergent indicators from the eight categories proposed. Consistent points were identified, such as the need to adapt to quality indicators and develop action plans to improve educational quality, as well as discrepant points, such as varied perceptions of the university licensing process. The conclusions indicate that entropy plays a significant role in university educational management, influencing organization, functioning, and educational quality, particularly during the licensing process. Equal gender representation among key participants allowed for a balanced analysis of how men and women perceive and address entropy-related challenges in higher education. This balance offers valuable insights into potential gender differences in leadership approaches, decision making, and conflict resolution within the university context. While both men and women faced similar organizational challenges, their responses often reflected different perspectives, influenced by gendered experiences in professional settings. Further research on these gender-based distinctions could contribute to more nuanced strategies for managing entropy and improving educational quality in a manner inclusive of diverse leadership styles.*

***Keywords:*** *entropy, university, licensing, and educational management*

## 1. Introduction

Entropy represents the measure of disorder present in a system, where an increase in entropy leads to disorder. From a university perspective, it is inferred that an organized program fosters understanding and advancement by students (Consejo Nacional de Educación, 2020). Although the concept of entropy originates in Physics and is related to chaos or lack of organization, it is of great importance in the research of systems in all fields (Ávila Ávila et al., 2020). In this sense, managing information becomes fundamental to maintaining organization and security in the system (Villasana Arreguín et al., 2021). Therefore, it is necessary to direct efforts towards the information generated, received, or retained during the development of educational activities (Ávila Ávila et al., 2020; Escorcia Guzmán & Barros Arrieta, 2020).

In the university setting, entropy represents the inherent disorder and complexity that arise in the educational process, stemming from a variety of internal and external factors. Effectively managing this entropy is crucial not only to maintain operational efficiency and high educational quality, but also to foster an adaptive, dynamic, and competitive academic environment. By addressing the sources of disorganization and unpredictability, universities can better respond to changing demands and enhance institutional resilience (Montoya Carvajal et al., 2023; Revolledo-Novoa & Fretel-Gutiérrez, 2021).

University teaching professionals perform various functions, with their main tasks including teaching, research, social outreach, and university management (Ríos López et al., 2021). Indeed, even the Basic Quality Conditions stipulate that educational institutions must have well-equipped laboratories, libraries, and research departments (Ríos López et al., 2021). Additionally, at least 25% of professors must work full-time, prioritizing research (Ventura Montes, 2020). These measures have been promoted by political leaders with the aim of raising educational quality in the country. However, universities with more resources and tradition face challenges, raising questions about the impact on institutions located in more remote areas, such as the southern highlands and the jungle.

Some politicians have voiced their objection to the new legislation, arguing that it poses a threat to university autonomy and freedom of thought expression. Additionally, they consider it a significant setback in the education of university students, which would affect a considerable number of students, approximately 50,000, who have not yet obtained their university degree (Ríos López et al., 2021).

The challenges facing society, together with the academic crises affecting students, teachers, curriculum, and strategies, are generating new demands and requirements that are fundamentally transforming the objectives and conditions of higher education. These changes in the academic landscape reflect the increasing complexity and unpredictability of educational systems. The Austrian physicist Ludwig Boltzmann was the first to give a statistical explanation of entropy, relating it to the concept of disorder. His ideas on the behavior of systems in thermodynamic equilibrium can serve as a valuable metaphor for understanding how educational institutions, under increasing pressures, can experience disorganization and unpredictability, yet maintain a dynamic and evolving state (Marin Ruiz, 2014). Furthermore, research is conducted within the theory of chaos, which explains complex phenomena characterized by nonlinear behaviors and difficulty in making precise measurements and calculations (Montoya Carvajal, 2022; Montoya Carvajal et al., 2023).

Research related to entropy reveals that this concept is closely linked to the sciences, and as its study deepens, controversies arise around its meaning, which turns out to be extremely debated. Furthermore, both faculty and university students use the term entropy in relation to disorder (Akbulut & Altun, 2020).

In Colombia, research has been conducted on the phenomenon of social entropy and its transition to educational entropy, arguing that entropy is related to an environment of constant change, characterized by randomness and uncertainty, aspects that are not adequately reflected in a static educational system, which has great theoretical mobility but limited mobility in terms of teaching and evaluation (Cárdenas Messa, 2019; Levina et al., 2016).

The research is theoretically grounded in two frameworks. The first one is Complexity Theory, represented by Edgar Morin (Hidalgo-Flor, 2022). The theory advocates a multidisciplinary approach, which allows for a deeper understanding of how various factors interact within an established system. By incorporating perspectives from multiple disciplines, the theory provides a comprehensive framework for analyzing and addressing the challenges inherent in complex systems, positioning it as an essential tool for advancing academic research.

The Complexity Theory in the university context suggests that universities are complex systems, characterized by the interaction of multiple parts and the presence of emergent phenomena. Morin highlights the diversity and interconnection of elements that make up a university institution, emphasizing the inherent complexity of its functioning (Axpe, 2019; Ramírez Ramírez et al., 2021).

The second one is the Theory of Educational Management, represented by Michael Fullan, who is one of the main references in the field of educational management and organizational change. Following the pandemic, opportunities have arisen to enhance learning and pressures to reform the education system, emphasizing the need for equity and excellence in education (Azorín & Fullan, 2022).

Under these two theories, the thematic unit Entropy is disaggregated into eight categories.

The first category is Controversial, which includes laws and regulations ensuring the quality of educational services. This category describes quality indicators, action plans, and the positive impact of the licensing process. It becomes controversial when regulations are established that generate opposition within and outside the organization, requiring analysis before implementation (Crespo Ortiz, 2024; Mérida Serrano, 2013). This way internal conflicts among the university staff are avoided (Torres Osorio, 2020).

The second category is a Changing Educational Environment, where the difficulties in understanding the process experienced by teachers and authorities are described. The challenges that arose when they were resistant to change, the hard teamwork, and understanding that university management is aligned with quality models, which led to changes in the way of working. Faced with complexity, it is necessary to lead strategically, innovatively, and facilitatively so that solutions can be reached through dialogue (Brown, 2023; Craps, 2021; Ramírez Ramírez et al., 2021).

The third category is Uncertainty, which involves the Educational Community and encompasses the experiences and emotions related to uncertainty in meeting basic conditions in the university setting. To address this growing complexity, the university must adopt evidence-based management models (Cisternas Irarrázabal, 2021). Therefore, the need to rethink university management to effectively tackle complexity and uncertainty (Menjívar, 2020).

The fourth category, Static, addresses university management processes, such as licensing, and whether these processes drive change or are limited to bureaucracy. On the other hand, it is emphasized that quality in the university is a dynamic process that requires constant adaptation to the changing needs and realities of society (Chang Chuyes, 2019; Superintendencia Nacional de Educación Superior Universitaria, 2022).

The fifth category, named Evaluative, addresses the imposition of quality educational services, and explores perceptions regarding autonomy in their provision. Although some viewpoints suggest that the interruption of university processes leaves the community helpless, indicating a possible strategy to weaken autonomy and gain greater external control over the university. In the Peruvian case, having high-quality accreditation does not automatically guarantee compliance with minimum standards before entities such as the Ministry of Education or the National Superintendence of University Higher Education (Sunedu), which is inexplicable (Gallegos, 2017; Velásquez Benites et al., 2022). However, the creation of Sunedu was considered an important step in evaluating and supervising universities. But, at the same time, conflict arises between this entity and university autonomy, especially regarding the evaluation and licensing of new professional careers (Chávez Iirigoyen, 2022). Therefore, it is necessary to have perspectives from university authorities who experienced the licensing process, and through them, the experiences of the educational community are gathered.

The sixth category is Phenomenon, which encompasses Quality. In this aspect, concrete examples are described about the transformations that occurred within the university institution, and how these led to changes in the quality of the education they provide (Pérez Expósito et al., 2022). Likewise, the need for coherent policies to enhance educational quality in universities is emphasized, promoting mass accreditation and technological innovation, and valuing the role of teachers as leaders in educational quality (Auris Villegas et al., 2022; Pérez Expósito et al., 2022; Suyo-Vega et al., 2022).

The analysis of the seventh category, Multicausal, addresses the complexity of the licensing process, revealing the crucial role of authorities, lived experiences, challenges faced, and inherent complexities. However, despite these considerations, there is no evident improvement in educational quality observed. In this sense, the importance of continuing to debate to strengthen institutional autonomy and foster academic development in universities is highlighted (Gallegos Ruiz Conejo et al., 2023). Likewise, efforts arise to adapt the university's purposes to social demands that are subject to pressures from various interest groups both within and outside the institution. These pressures can generate tensions and, at times, open conflicts, reflecting the complexity of the university reform process and the diversity of interests at stake (Padua N., 1988).

Finally, the eighth category is Educational Management, which includes didactic strategies. This category describes the impact of the restructuring process on the didactic strategies used by teaching staff. However, resistance to change persists in the Institutional Licensing process as a natural response to the imposition of regulatory changes and the perception of an increase in workload and modifications in teaching practice (Ahumada-Bastidas & Sánchez - Huarcaya, 2022).

The categories presented encapsulate the inherent complexity and chaotic dynamics that characterize the university academic environment. In this context, entropy reflects the diversity of disciplines, flows of information, and interactions within the university community. As these elements interact with each other, varying degrees of disorder and complexity arise, which can affect efficiency, communication, and organizational structure within the institution. Likewise, the proper understanding and management of entropy in the educational sphere are crucial to ensuring an environment conducive to learning and academic excellence (Cárdenas Messa, 2019; Wong-Cabanillas et al., 2024).

The effective management of chaos and complexity in the university environment can influence the quality of educational processes and the satisfaction of students and teachers. It highlights the essential role of the faculty in implementing a pedagogy oriented towards skills relevant to the 21st century (Mateo Díaz & Rhys Lim, 2022; Suyo-Vega et al., 2023). Therefore, addressing entropy proactively becomes crucial to maintaining high standards of quality and promoting continuous improvement in universities.

The proper management of this university entropy becomes a crucial challenge to promote academic effectiveness, innovation, and educational progress. In relation to the aforementioned, the following question is raised: How can entropy lead authorities directing higher education institutions to exhibit instability behaviors in achieving strategic objectives related to basic quality conditions? Furthermore, subcategories related to entropy derived from the concept were analyzed, such as Controversial, Changing, Uncertainty, Static, Evaluative, Phenomenon, Multicausal, and Educational Management. The purpose of the study is to analyze and understand the phenomenon from the experience and significance of entropy in the development of educational services in higher education.

## 2. Methodology

The study adopted a qualitative approach and employed the phenomenological case study method (university licensing process), with elements of grounded theory, as it facilitates systematic and rigorous research. Additionally, phenomenology was integrated to compare the experiences, differences, and similarities among the participants (De la Espriella & Gómez Restrepo, 2020;

Hernández-Sampieri, R. Mendoza, 2019; Vives Varela & Hamui Sutton, 2021). Likewise, from a constructivist perspective, the study allowed key participants to construct their experiences in relation to a specific phenomenon (Guba & Lincoln, 1994). In this sense, the research focused on interpreting the experiences lived by university authorities in the licensing process.

The subjects selected for the research, referred to as key participants, were university officials who had experience in the licensing process. They were authorities from state universities with extensive university backgrounds, having more than five years of experience. These authorities played a fundamental role in designing and implementing strategies to strengthen the university system in which they operate, thus ensuring quality in all areas of their respective institutions.

The individuals selected for this research were ten (10) in total, comprising five (5) males and five (5) females, as it was an in-depth interview study (Hernández-Sampieri, R. Mendoza, 2019). Likewise, the selection is based on gender equality in higher education and research in Peru (Nieto Montesinos et al., 2019). Despite the increase in women's participation as professionals dedicated to teaching, their representation in high-level academic spaces remains low (UNESCO - IESALC, 2021). The proportion of women is significant when compared to the total number of female professors (Chávez Irigoyen & Penelas Ronso Merino, 2021).

Gender equity in the interviews is aimed at better understanding the issues and learning about the experiences of both men and women in higher education and research. For data collection, informed consent was obtained from the authorities, and dates and times for the interviews were coordinated. The interview duration averaged 45 minutes.

Table 1 describes the coding of the interviewees. Subsequently, the research team discussed and analyzed the interviewees' responses. Finally, the results and conclusions were drafted.

**Table 1:** Coding of key participants

| Nª | Current Positions | Gender | Years of Experience | Code |
|---|---|---|---|---|
| S1 | Director of Quality | Male | 28 | S01M28 |
| S2 | Director of Graduate Studies | Female | 20 | S02F20 |
| S3 | National Director of Research | Female | 17 | S03F17 |
| S4 | Director of Teaching Research | Female | 14 | S04F14 |
| S5 | Director of Teaching Research | Female | 13 | S05F13 |
| S6 | Director of Research | Male | 7 | S06M7 |
| S7 | Head of Quality | Male | 11 | S07M11 |
| S8 | Director of Research | Male | 23 | S08M23 |
| S9 | Director of Quality | Male | 18 | S09M18 |
| S10 | Director of Quality | Female | 17 | S10F17 |

The instrument was validated through professional researchers in education. Likewise, it met the criteria of quality: (a) Credibility, (b) Transferability, (c) Reliability and confirmability, and (d) Reflexivity (Korstjens & Moser, 2018).

In Table 2, strategies and activities developed according to quality criteria are described, such as interaction with study subjects, data triangulation, member checking, thorough description, audit trail, and journaling.

**Table 2:** Strategies and activities developed according to quality criteria

| Criteria | Strategies | Activities conducted |
|---|---|---|
| Credibility | Interaction with study subjects | University authorities were contacted via phone call, confirmed via email, and in some cases, virtually via WhatsApp. Then, the interview guide and informed consent were sent via email prior to the interview. Finally, the interview was conducted through a virtual meeting using the Zoom platform. |
| | Data triangulation | The research team conducted a thorough and critical analysis of each obtained response, which was then compared with the theoretical framework (background and theoretical foundations). |

| Criteria | Strategies | Activities conducted |
|---|---|---|
| | Member checking | Each key participant was selected according to the inclusion criteria, information that is evidenced on the transparency portal of each university. For this purpose, a code recognizable by the team was assigned to each participant. Additionally, this coding is evident in Table 1. |
| Transferability | Thorough description | The responses were first transcribed in Spanish, then in English, and in both cases, ensuring scientific rigor between them: (a) Autonomy was provided to each interviewee when their answers were superficial and could not be further probed (b) Beneficence was observed when the interviewee responded with total freedom without prejudice, with full assurance that all information provided was exclusively for research purposes (c) Justice was ensured when all interviewees were subject to the same requirements. One practice involved searching for keywords, allowing the team to identify the most frequently mentioned terms that were considered relevant and assigned a color in the coding, as seen in Table 3. |
| Reliability and confirmability | Audit trail | The responses were coded with the initials of gender, years of university experience, and subject number. For example: S01M28 indicates that it is the first subject, male gender, with 28 years of university experience. These codifications are observed and detailed in Table 3. |
| Reflexivity | Journal | The recordings were transcribed in Word format. Each researcher analyzed the responses of each participant and, based on their experience, established the emergent element for each category. The emergent element was discussed within the team, as everyone provided their viewpoints, and upon reaching a consensus, various colors were assigned to identify them. Subsequently, using Atlas Ti software, the hermeneutic unit called Entropy was created. |

## 3. Results

The results present all the categories and subcategories considered to develop the thematic unit of Entropy. The categories described are (a) Controversial, (b) Changing, (c) Uncertainty, (d) Static, (e) Evaluative, (f) Phenomenon, (g) Multicausal, and (h) Educational Management. Likewise, the subcategories were (a) Normative laws ensuring the quality of educational services, (b) Changing Educational Environment, (c) Educational Community, (d) Management processes, (e) Imposition of quality educational services, (f) Complexity, and (g) Didactic strategies. Each of them is intertwined with the codes identified for each subcategory, as shown in Table 3 (color coding) and in Figures 1, 2, 3, 4, 5, 6, 7, and 8.

**Table 3:** Categories, subcategories, codes, and color coding of the thematic unit

| **Category** | **Subcategories** | **Codes** | **Colors Codes** |
|---|---|---|---|
| Controversial | Laws and regulations ensuring the quality of educational services | Arrange according to quality indicators | |
| | | Make action plans | |
| | | Improve educational quality | |
| | | Positive impact | |
| Changing | Changing educational environment | Difficulties in understanding the process | |
| | | Resistance to change | |
| | | Hard work and teamwork | |
| | | Seeking to align university management with quality models | |
| | | Change in the way of working | |
| Uncertainty | Educational community | Disorganized documentation | |
| | | Unawareness about what is required for licensing | |
| | | Seeking to work with everyone using the same language | |
| | | Change in the parameters | |
| | | An atmosphere of uncertainty was generated | |
| | | SUNEDU provided consultations | |
| Static | Management processes | There was a lot of stress during the licensing process | |
| | | The need for quick technical assistance | |
| | | The education service was improved | |

| Category | Subcategories | Codes | Colors Codes |
|---|---|---|---|
| | | There is a bit of bureaucracy in the procedures | |
| | | Always seeking continuous improvement | |
| Evaluative | Imposition of quality educational services | Autonomy is maintained within the legal framework | |
| | | Demonstrate educational quality | |
| | | Licensing allowed us to understand educational quality models | |
| Phenomenon | Quality | Having clear policies | |
| | | Having precise strategies and methodologies | |
| | | Incentivize institutional identity | |
| | | Automate management processes | |
| | | More training | |
| Multicausal | Complexity | Technical visit | |
| | | Installing sufficient rooms for attention | |
| | | Install and enable laboratories | |
| | | Hard and constant work | |
| | | Adapting to the new regulations | |
| Educational management | Didactic strategies | It was implemented with new technological equipment | |
| | | There were quite a few changes in the educational framework | |
| | | Agreements were made with UNESCO | |
| | | Having a broader vision | |
| | | Changes in the way classes are conducted | |

Regarding the Controversial category, the subcategory of Laws and regulations ensuring the quality of educational services was analyzed. Figure 1 details controversial topics in higher education management related to the licensing process and its impact on compliance.

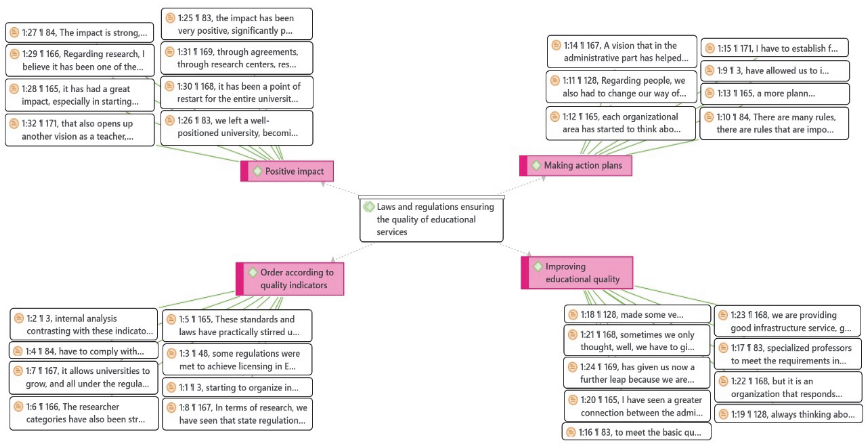


**Figure 1:** Category Controversial and Subcategories

Figure 1 groups the emerging subcategories under the Controversial category: (a) Organizing according to quality indicators (b) Making action plans (c) Improving educational quality and (d) Positive impact.

These subcategories have generated controversy due to the possible imposition of uniform standards. However, this process has driven significant changes, such as organizing according to quality indicators, formulating action plans, and improving education. Despite criticism, its positive impact on academic excellence and continuous improvement is recognized. Interviewees have observed an adaptation to quality indicators, the development of action plans, and a broader view of the educational system through an organizational and rectification process.

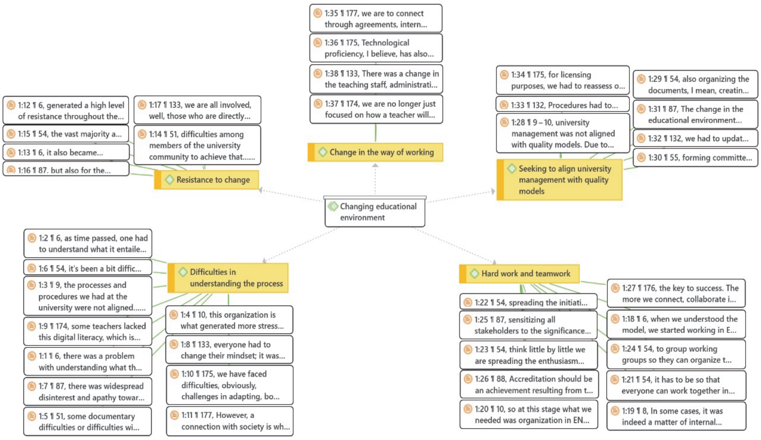


**Figure 2:** Category Changing Educational Environment and Subcategories

Figure 2 displays the responses of key participants, highlighting the emerging subcategories: (a) Challenges in understanding the process (b) Resistance to change (c) Hard work and teamwork (d) Seeking alignment of university management with quality models and (e) Change in the way of working.

The licensing process in higher education management has driven significant changes, although initially facing challenges such as resistance to change and understanding of the process by the university community. Over time, interviewees recognized the need to align with quality models, leading to a review of regulations, improvement in institutional identity, and user attention. Although moments of uncertainty and challenges arose, they valued the change for its impact on continuous improvement in all processes. Discrepancies lay in the changing educational environment, highlighting the need for teamwork to ensure educational quality.

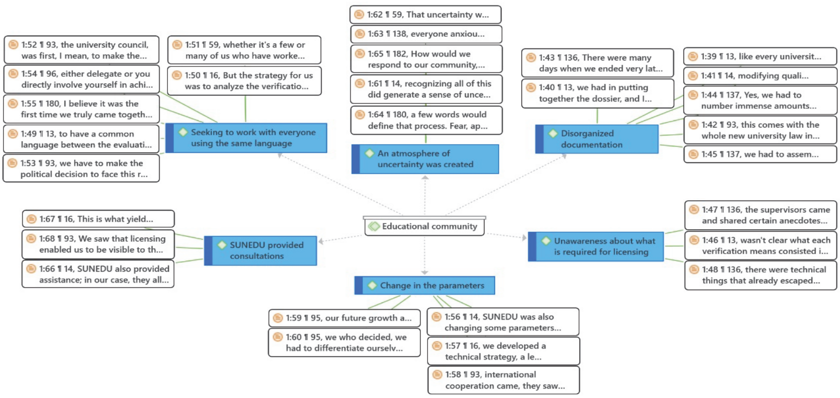


**Figure 3:** Category Uncertainty and Subcategories

In Figure 3, six emerging subcategories are visualized:

(a) Disorganized documentation (b) Lack of knowledge about the documentation required for licensing (c) Joint decision-making, teamwork (d) Paradigm shift (e) Generation of uncertainty and (f) Presence of Sunedu through consultations.

Acquiring licensing generated experiences and emotions among members of the university community. The initial difficulties were organizing documentation and understanding the required requirements, which generated uncertainty and concern. However, despite the difficulties, university authorities implemented strategies to address the challenges. Ultimately, upon completing the process, they experienced feelings of satisfaction upon obtaining institutional licensing. The emotions expressed by the authorities were fear, apprehension, and anguish. However, they maintained expectations, hope, and excitement. Finally, the licensing process represented a significant change in the pursuit of excellence in educational quality.

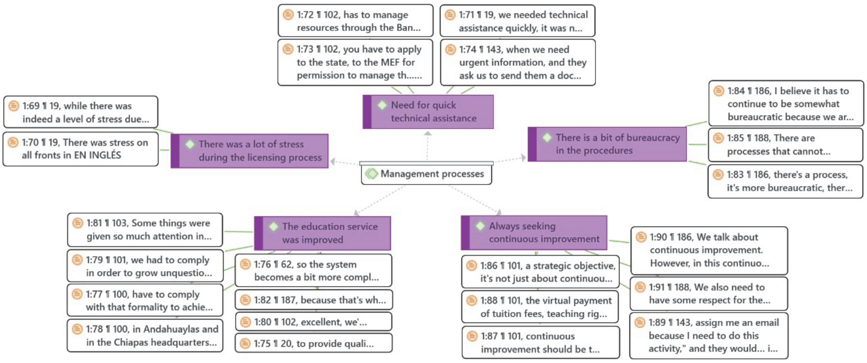


**Figure 4:** Category Static and Subcategories

In Figure 4, five subcategories emerge: Educational improvement, Reduction of bureaucracy, Stress, pursuit of continuous improvement, and need for quick technical assistance. Interviewees expressed divergent perceptions about the Static subcategory and its behavior in the licensing process. Some considered it an opportunity to improve university administration through this process, while others saw or felt it as a bureaucratic process. The process generated stress as all requirements had deadlines.
Although they recognized the existence of bureaucracy, authorities and staff were willing to achieve the goal, which meant continuous and permanent work with the entire university community. Likewise, a comment is made about whether the process was an imposition or necessary to ensure quality. This category highlighted the complexity of opinions in the licensing process and attainment.

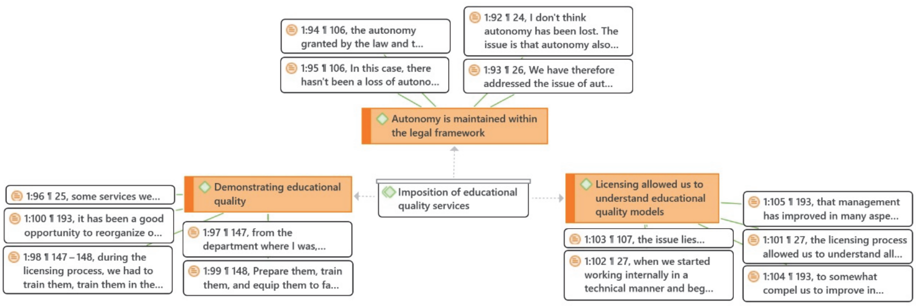


**Figure 5:** Category Evaluative and Subcategories

In Figure 5, three subcategories stand out: Understanding of educational quality models, Autonomy within the legal framework, and Demonstration of university educational quality. University authorities considered that autonomy has been maintained in the provision of educational services within the established legal framework. Some expressed that the licensing process is an opportunity for continuous improvement, although others perceived it as overly bureaucratic.

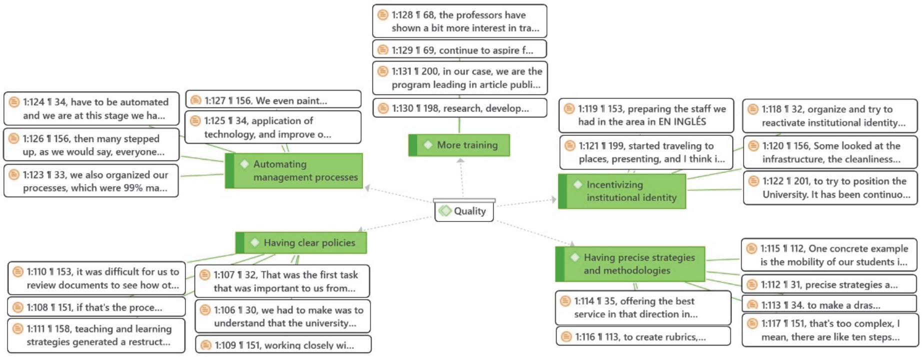


**Figure 6:** Category Phenomenon and Subcategories

In Figure 6, five subcategories emerge: Automation of management processes, clear policies, institutional identity, increased training, and clear methodological strategies. University authorities experienced significant changes in both administrative and academic aspects.

Clear policies were established in the academic and research spaces within the university. Training of teaching and administrative staff was prioritized. A culture of continuous improvement was promoted to strengthen institutional identity and enhance educational quality.

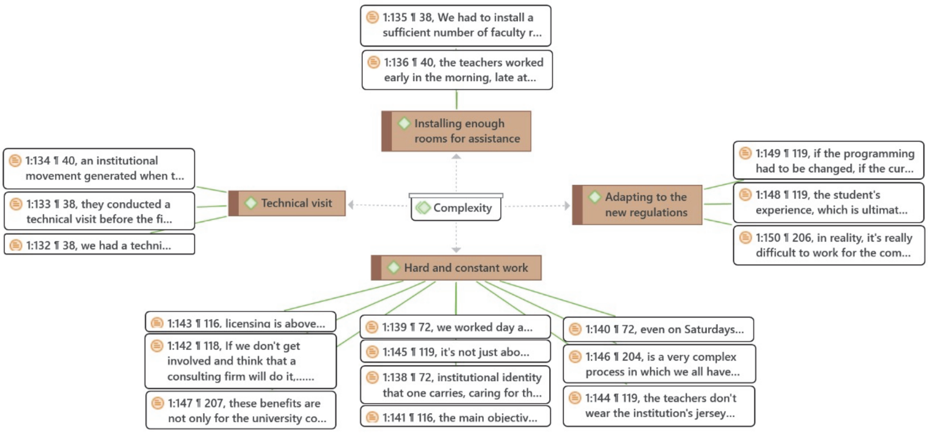


**Figure 7:** Category Multicausal and subcategories

The figure 7 displays emerging categories about Complexity, which include adaptation to new regulations, technical visits, installation and outfitting of laboratories, continuous work, and the establishment of sufficient facilities for service delivery.

Authorities stated that during the licensing process, public universities faced difficulties due to technical visits. These visits required intense preparation and organization. Projects that were pending, such as infrastructure investments to ensure the availability of rooms and laboratories, had to be implemented. In some cases, adaptation to new regulations was necessary, and the educational community made its greatest efforts to meet the requirements.

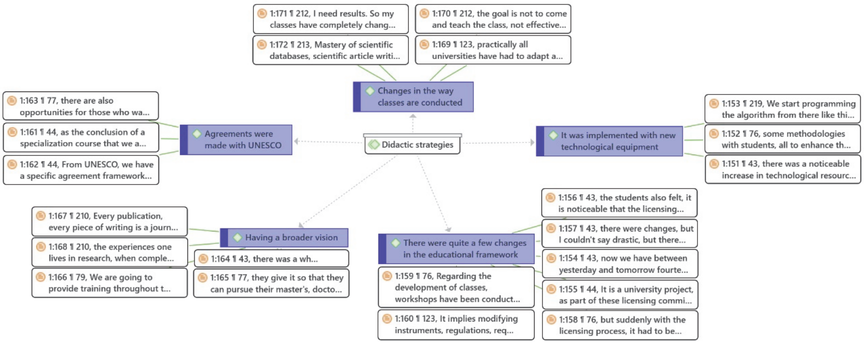


**Figure 8:** Category Educational Management and subcategories

From the Educational Management category arises the subcategory Didactic Strategies. In Figure 8, five subcategories emerge: changes in the educational framework, broader vision, generation of agreements, changes in the way classes are conducted, and implementation of new technological equipment.

University authorities mention that the licensing process notably impacted the application of didactic strategies used by teachers; new equipment and laboratories were implemented. Additionally, agreements were signed with other universities, international organizations, internships, and mirror classes to promote institutional vision and gradually modify teaching methods.

In conclusion, the licensing experience improved areas, updated personnel, and promoted a culture of continuous improvement within the university.

## 4. Discussion and Conclusion

The results of the Entropy developed in the university during the licensing process show both convergent and divergent points. University authorities acknowledged the need to align with quality indicators to improve educational quality, as evidenced in the Controversial category (Crespo Ortiz, 2024; Mérida Serrano, 2013). Despite the challenges, academic excellence is highlighted, as society demands quality education. As with any process, when it is unfamiliar, it generates uncertainty or lack of understanding of the requirements. However, over time, members of the university community recognize the need to align with quality models (Brown, 2023; Craps, 2021; Ramírez Ramírez et al., 2021).

The changes were gradual, reflecting an evolution towards a management more aligned and focused on educational quality. Without neglecting the emotional experiences that varied during the licensing process, from anguish and fear to hope and excitement (Brown, 2023; Craps, 2021; Ramírez Ramírez et al., 2021). The university authorities led the policies and successfully implemented various strategies in the teaching process. There were differences, as in all processes where procedures or requirements are not fully understood or known. However, they later experienced diverse emotions, especially on the day when the licensing was obtained.

Likewise, some authorities felt that the licensing process is an opportunity for improvement, while others feel that it is overly bureaucratic (Chang Chuyes, 2019; Superintendencia Nacional de

Educación Superior Universitaria, 2022). This complexity of opinions or feelings reflects the complexity and challenges faced during the process of change. Maintaining autonomy was another divergent aspect, as the central framework had been established for the provision of an educational service; now there is a need to promote continuous improvement (Gallegos, 2017; Velásquez Benites et al., 2022).

The interviewees indicated that significant changes in the university included improvements in educational quality, clear policies, and staff training (Pérez Expósito et al., 2022; Suyo-Vega et al., 2022). The outcome of a management focused on improving and positioning the university institutionally was evident. At some point, there was discussion about the complexity of the process, as the ideal scenario involved strengthening autonomy and fostering academic development (Gallegos Ruiz Conejo et al., 2023).

Finally, significant changes included the teaching strategies of faculty members and investment in technological resources (Ahumada-Bastidas & Sánchez - Huarcaya, 2022). Actions that demonstrate the institutional commitment to innovation and educational excellence through the continuous updating of faculty members, leading to the improvement of their pedagogical practices.

After the analysis, the new coinciding category was Continuous Improvement. It not only arises to maintain quality standards but also to seek ways to optimize and enrich the experience of both teachers and students. This Continuous Improvement involved adjusting academic programs, implementing technological resources, faculty training, among others (Ahumada-Bastidas & Sánchez - Huarcaya, 2022; Ávila Ávila et al., 2020).

The second emerging category was Adaptation to Change. This change is reflected in the flexibility and ability to adapt to the needs of students and society in general. Adaptation involves new teaching methodologies, adoption of emerging technologies, and review of institutional policies (Ávila Ávila et al., 2020; Consejo Nacional de Educación, 2020).

Similarly, discrepancies or divergent points were found in the university licensing process. For some, it was an opportunity to promote excellence, while others considered it a bureaucratic burden that generated resistance and discontent within the educational community. This disparity of opinions reflects the complexity of the licensing process and the feelings it generates. Therefore, there is a need to analyze and understand the concerns and needs of all those involved in the licensing process (Ávila Ávila et al., 2020; Consejo Nacional de Educación, 2020).

Another divergent category was the changes in educational practices. The introduction and implementation of technology were positive; however, it is necessary to reflect on the effects on personnel and internalize what is taught and learned (Ávila Ávila et al., 2020; Consejo Nacional de Educación, 2020).

Finally, analyzing the regulations led to disagreement on whether these were impositions or respected university autonomy. This situation was complex and controversial among university members, ultimately guiding the pursuit of educational excellence towards society (Ávila Ávila et al., 2020; Villasana Arreguín et al., 2021).

Similarly, entropy generated instability in achieving objectives, especially in an academic space governed by a diversity of disciplines and research activities (Montoya Carvajal, 2022; Montoya Carvajal et al., 2023; Revolledo-Novoa & Fretel-Gutiérrez, 2021).

In conclusion, the research outlines the influence of Entropy on the functioning of universities. Interviewing the key actors involved in an important process for the country and for universities allows for understanding the complexity and identifying areas of opportunity to address new challenges.

One of the main challenges of this research was the conceptual complexity of the term Entropy in the university context. Given that its application in educational management is still incipient, it was necessary to contextualize before the application of the instruments for data collection. This implied the elaboration of a solid theoretical framework that would allow its adequate interpretation.

Likewise, significant variability was identified in the understanding of the concept by the actors interviewed, which represented a methodological challenge in the analysis of the responses. The subjectivity in the interpretation of the term according to the perspective of each university authority required a triangulation process to minimize biases and guarantee the validity of the findings.

Finally, another limitation was the need for a more in-depth study on the effects of Entropy on university management. Although the results obtained offer a first approach, future research could broaden the approach with mixed methodologies and comparative analyses between different institutions to strengthen the applicability of the findings in different educational contexts.

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