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STRUCTURAL EQUATION MODELING (SEM) FOR THE EVALUATION OF STRATEGIC AND ADMINISTRATIVE COHERENCE IN PUBLIC UNIVERSITIES

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SUMMARY

This study explores the relationship between strategic coherence and administrative performance in public universities, using structural equation modeling (SEM). Strategic coherence, understood as the alignment of objectives and practices, is crucial for institutional effectiveness in higher education. The study implements a three-stage methodological approach: literature review, data analysis, and identification of observable variables to measure latent constructs. The results of the SEM analysis reveal a positive but moderate relationship

between strategic coherence and administrative performance. Strengths are identified in the clarity of the mission and vision, and strategic communication, as well as areas for improvement in participation in strategy formulation and implementation. The study concludes that, while strategic coherence influences administrative performance, this relationship is complex and mediated by other factors. Recommendations are proposed to strengthen participation, improve strategy implementation and personnel management, acknowledging the limitations of the model and the need for future research.

KEYWORDS: Coherence, performance, management, models, universities.

ABSTRACT

This study explores the relationship between strategic coherence and administrative performance in public universities using structural equation modeling (SEM). Strategic coherence, understood as the alignment of objectives and practices, is crucial for institutional effectiveness in higher education. The study implements a three-stage methodological approach: literature review, data analysis, and identification of observable variables to measure latent constructs. The results of the SEM analysis reveal a positive but moderate relationship between strategic coherence and administrative performance. Strengths are identified in the clarity of mission and vision, and strategic communication, as well as areas of opportunity in participation in strategy formulation and implementation. The study concludes that, while strategic coherence influences administrative performance, this relationship is complex and mediated by other factors. Recommendations are proposed to strengthen participation, improve strategy implementation, and improve personnel management, recognizing the limitations of the model and the need for future research.

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1. Introduction

The evaluation of strategic coherence and its relationship to administrative performance in public universities is a critical area of study that seeks to understand how an institution aligns its strategic objectives with operational practices. Strategic coherence refers to the harmonization of policies and measures at different levels of an organization to ensure that all efforts contribute to the achievement of overall objectives. This concept is particularly relevant in the context of public universities, where effective public management and administrative performance are essential for fostering academic excellence and institutional effectiveness (Webber et al., 2022; Mielcarek , 2024).

While focusing on strategic coherence is crucial for improving administrative performance, it is also important to consider the potential trade-offs between immediate performance gains and long-term strategic flexibility (Jia & Hu , 2021; Miroshnychenko et al., 2021). Balancing these aspects can be challenging for public universities facing complex environments.

To assess strategic coherence and its relationship with administrative performance in public universities, several concepts and methodologies are used, particularly structural equation modeling (SEM), which provides a solid framework for testing and developing theories about the interactions between strategic coherence and performance metrics in educational institutions (Yang et al., 2021, Al- Kahtani et al., 2024).

It is essential that organizations, including public universities, implement coherent strategies to improve performance. A coherent strategy is characterized by a consistent set of choices that reflect the institution's vision and objectives, which in turn fosters a more effective and participatory academic environment (Dirwan et al., 2024; Oh et al., 2025).

The assessment of strategic coherence is often intertwined with the identification of critical success factors (CSFs) that significantly influence project performance within universities. These critical success factors encompass variables that influence the integrity and fulfillment of university initiatives and projects, including stakeholder satisfaction, effective communication, and conflict resolution (Ali et al., 2024; Li et al., 2024).

Integrating these factors into the evaluation framework allows for a full understanding of how strategic coherence translates into improved administrative performance. The result is the identification of observable indicators that reflect the operationalization of strategic coherence within the administrative context of public universities (Biondi & Russo, 2022, Pactwa et al., 2024).

Considering the above, the objective of the research was to explore the use of Structural Equations (SEM) for the evaluation of Strategic and Administrative Coherence in Public Universities. To this end, the relevant literature was reviewed and the main factors that influence the performance of SEM were identified. A detailed analysis of the data was carried out and observable variables were identified that can be used to measure the latent variables associated with the performance of projects that consider strategic coherence.

2. Materials and Methods

2.1 Data used

This study is based on a sample of 500 observations that assess strategic coherence and administrative performance in public universities. The data are structured around two main constructs.

2.2 Statistical Models

This study implemented a multifaceted analytical approach to examine the relationship between strategic coherence and administrative performance in public universities. The methodology employed includes the following statistical techniques and models:

Descriptive Analysis: A comprehensive descriptive statistical analysis was performed, which included: measures of central tendency (mean, median), measures of dispersion (standard deviation), quartile and range analysis, and identification of extreme values. These statistics provided an initial understanding of the distribution and behavior of the observed variables.

Correlation Analysis: A bivariate correlation analysis was implemented using a correlation matrix, visualized through a heat map . This analysis allowed us to: identify associations between variables, evaluate the strength and direction of the relationships, detect potential multicollinearity problems, and validate the structure of the proposed constructs. Structural Equation Model (SEM); it was based on a structural equation model, which was structured in two main components:

Measurement Model: for the specification of two latent variables: strategic coherence and administrative performance, validation of the factorial structure through observable indicators, evaluation of factor loadings and communalities, and analysis of convergent and discriminant validity

Structural Model: for estimating causal relationships between latent constructs, evaluating path coefficients (path coefficient , analysis of direct and indirect effects and evaluation of the statistical significance of the relationships

2.3 Model Evaluation
The quality of the model was evaluated using various fit indices: MLW target (Maximum Likelihood with Wishart), SLSQP optimization method (Sequential Least Squares Programming)

2.4 Visualization of Results Multiple visualization techniques were implemented, such as: box plots for distribution and outlier analysis, histograms with kernel density estimates for individual variables, correlation matrix with heat map, and path diagram . diagram) for the SEM model

2.5 Standardized Estimates: The analysis produced standardized estimates that included: Path coefficients, standard errors, z-values, and p-values for significance tests

3. Results
The standardized estimates that measure strategic coherence present the following characteristics, firstly the clarity of the institutional mission and vision shows an average rating of 3.77 (σ = 0.72), being the best evaluated indicator within this construct, which suggests a generally positive perception of the institutional definition.
The alignment of strategic objectives registers an average of 3.51 (σ = 0.83), indicating a moderately positive alignment between objectives and resources, while the Implementation of Strategies presents an average of 3.40 (σ = 0.90), reflecting a medium-high level of execution of strategic plans.
Strategic communication, for its part, showed an average of 3.60 (σ = 0.80), suggesting above-average communication effectiveness, and participation in the formulation showed an average of 3.30 (σ = 1.00), presenting the greatest variability among the coherence indicators.
The administrative performance variables exhibit the following behavior, the results of which are shown in Figure 1.

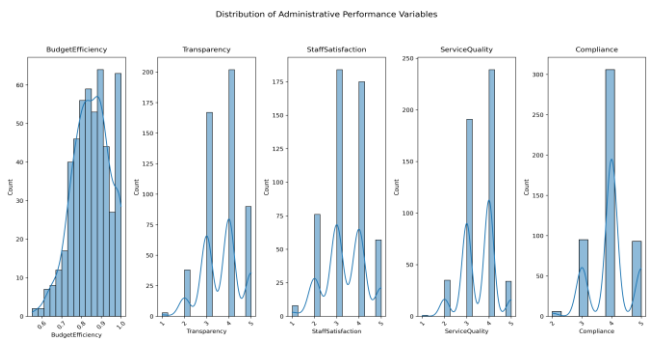

Figure 2. Administrative performance in health services.

Budgetary Management Efficiency has an average of 0.85 (σ = 0.10), indicating a high level of efficiency in budget execution, while Transparency in management reaches an average of 3.70 (σ = 0.80), reflecting a significant commitment to accountability. Administrative staff satisfaction averaged 3.40 (σ = 0.90), suggesting a moderate level of job satisfaction, while the quality of administrative services averaged 3.54 (σ = 0.73), indicating a positive perception of service quality. Regulatory compliance received the highest score, with an average of 3.97 (σ = 0.65), highlighting a strong commitment to the regulatory framework.

Distribution Characteristics
The data show a relatively symmetrical distribution, with minimum values of 1 and maximum values of 5 on the Likert scales. Most variables show a concentration in the interquartile range between 3 and 4, suggesting a tendency towards moderately positive evaluations (Figure 3).

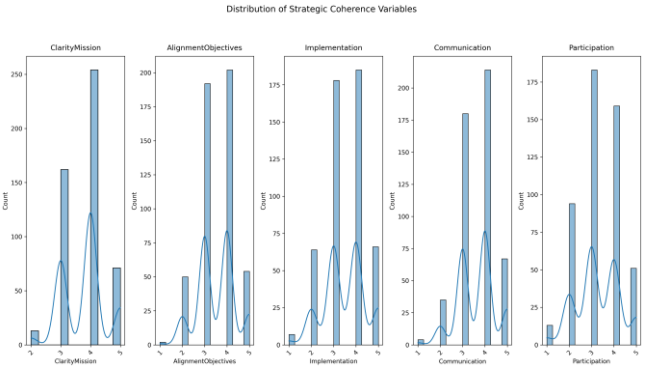

Figure 3. Distribution of coherence variables

Compliance with regulations stands out for having the lowest dispersion (σ = 0.65) and the highest mean (3.97), while Participation in Formulation shows the greatest variability (σ = 1.00), indicating greater differences between institutions in this aspect. The consistency in the standard deviations (mostly between 0.65 and 1.00) suggests an adequate level of discrimination in the measurements, allowing the variability between the different educational institutions analyzed to be captured effectively. Based on the analysis performed using structural equation models and complementary statistical techniques, the following findings are presented:

Relationship between main constructs
The relationship between strategic coherence and administrative performance shows a positive but moderate effect (z- value = 0.305, p = 0.760) as shown in Figure 3. While the direction of the effect is

consistent with the initial hypothesis, the statistical significance does not reach conventional levels, suggesting that the relationship is more complex than initially proposed.

The analysis of the relationships between main constructs for strategic coherence showed strengths such as the clarity of the mission and vision stands out as the most robust component (μ = 3.77, σ = 0.72), indicating that universities have managed to establish understandable strategic directions and strategic communication showed a favorable performance (μ = 3.60, σ = 0.80), suggesting effective channels for disseminating the strategy.

Areas were also detected of opportunity, where participation in the formulation showed the greatest variability (σ = 1.00), indicating significant disparities between institutions in terms of stakeholder inclusion and the implementation of Strategies (μ = 3.40, σ = 0.90) suggests gaps between planning and execution.

For its part, the analysis of the relationships between main constructs for the evaluation of administrative performance showed outstanding aspects, such as compliance with regulations emerging as the most solid indicator (μ = 3.97, σ = 0.65), reflecting a strong commitment to the regulatory framework and efficiency in budget management revealed positive results (μ = 0.85, σ = 0.10), indicating an effective administration of resources. Similarly, administrative performance requires areas for improvement such as the satisfaction of the Administrative staff (μ = 3.40, σ = 0.90) suggests the need to strengthen human talent management policies and the variability in the quality of Services (σ = 0.73) indicates inconsistencies in the provision of services between different areas.

Analysis of Covariances and Cross-Effects

The model results reveal interesting patterns of covariation, which can be visualized in the correlation matrix presented in Figure 3.

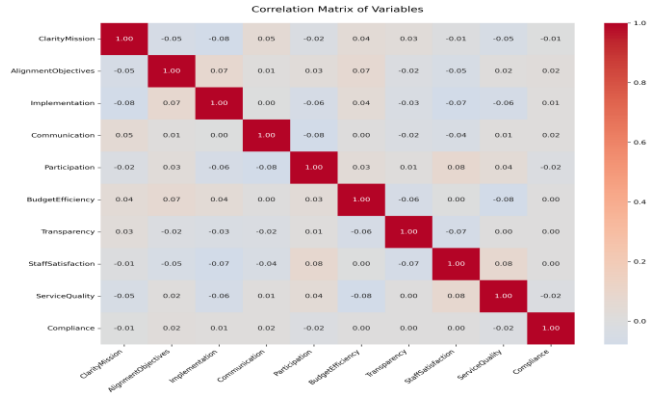

Figure 3. Correlation matrix for the analysis of Covariances and Cross Effects

The strategic coherence variables show significant positive correlations with each other ($p < 0.001$), suggesting a coherent structure of the construct, while the Administrative Performance indicators show moderate correlations, indicating some independence in their dimensions.

4. Discussion

The findings of the analysis, based on the rigor of structural equation models, invite a deep reflection on the complex duality between Strategic Coherence and Administrative Performance in these institutions crucial for social and knowledge development (Habeeb & Eyupoglu 2024, Xanthopoulou , et al., 2024). Although the model reveals a positive, albeit moderate, effect between strategic coherence and administrative performance, the lack of statistical significance at conventional levels compels us to interpret this result with caution.

Far from invalidating the initial premise, this finding suggests that the relationship between these two constructs is more intricate and possibly influenced by variables not explicitly considered in the model (Muñoz et al., 2023; Muhaimeed et al., 2024). Such complexity is consistent with the idea that management effectiveness is not a simple reflection of planning, but rather the result of a dynamic interaction with the environment, organizational culture, and institutional adaptability.

By breaking down the strategic coherence builder, ideas emerge that outline the current landscape of planning in public universities. The clarity of the mission and vision stands out as a palpable strength, indicating a significant effort to establish a clear strategic direction for the university community. This shared understanding of the institutional purpose lays a solid foundation for coordinated action, as emphasized by the importance of a clear strategic direction for improving performance in public universities (Angola et al., 2019; Fumasoli & Hladchenko , 2023).

Similarly, strategic communication suggests that efforts to disseminate the strategy are being relatively effective, a crucial aspect for aligning individual and departmental actions with overall objectives [7], however, the analysis also points out areas of opportunity that deserve attention. The high variability in participation in strategic formulation reveals significant heterogeneity among institutions regarding the involvement of diverse stakeholders in defining the strategic direction (Andrin et al., 2024). This disparity could limit the sense of belonging and commitment to the strategy in those universities with

lower levels of inclusion (Agasisti & Bertoletti , 2019).

Furthermore, the implementation of strategies with a considerable standard deviation suggests the existence of gaps between planning and action, a recurring challenge in strategic management where the translation of plans into tangible results often becomes a bottleneck (Hera et al., 204., Toshov , 2024)

Regarding administrative performance, Regulatory Compliance stands out as a solid pillar, reflecting an institutional commitment to the regulatory framework that governs its operation, while efficiency in budget management also yields positive results, indicating a relatively effective administration of resources (Geethanjali , et al., 2024., Kess et al., 2024)

On the other hand, the notable dispersion in the satisfaction of administrative staff suggests the need to review and strengthen human talent management policies, recognizing that a motivated and satisfied staff is fundamental to operational efficiency (Khan et al., 2024, Tian et al., 2024), while the variability observed in the quality points to the existence of inconsistencies in the provision of services between different administrative units, which could impact the user experience and the general perception of institutional performance.

Finally, the analysis of covariances reveals patterns that enrich our understanding of the relationships between strategic coherence and administrative performance (Alam et al., 2024; Novelli & Spina , 2024). Significant positive correlations among strategic coherence variables suggest that these components tend to move in the same direction, reinforcing the idea of a coherent underlying construct. In contrast, moderate correlations among administrative performance indicators indicate a degree of independence among their dimensions, suggesting that improvement in one area does not necessarily translate automatically into improvement in others. This finding underscores the multidimensional nature of administrative performance in the university context.

5. Conclusions

The results suggest that the relationship between strategic coherence and administrative performance in public universities is positive but complex. While a favorable influence is observed, the variability in the indicators and the moderate statistical significance suggest that: administrative effectiveness does not depend exclusively on strategic coherence ; the existence of mediating or moderating factors that could be influencing this relationship; and that these factors lead to strengths in regulatory and planning aspects, but face challenges in implementation and change management.

The findings provide an empirical basis for decision-making in university management and suggest specific areas for future interventions aimed at improving institutional performance, such as strengthening participation in the strategic planning of higher education institutions. Improvements are needed in the implementation of administrative performance processes, given the gap identified in the implementation of strategies. This highlights the importance of strengthening monitoring and control mechanisms, especially in personnel management, as moderate levels of staff satisfaction indicate the need to review human resources policies.

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