

## ANALYSIS OF OPERATIONAL EFFICIENCY AND SERVICE QUALITY: CASE OF THE SOUTH VALDIVIA DAY HOSPITAL, GUAYAQUIL – ECUADOR

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### ABSTRACT

The study analyzes the relationship between operational efficiency and service quality at the Valdivia South Day Hospital, located in Guayaquil, Ecuador. The research is based on the problem that public hospitals face budget constraints, high demand, and complex regulatory frameworks, which make it difficult to guarantee efficient and quality services. In this context, the objective was to determine if there is a significant relationship between operational efficiency and service quality in this institution. A quantitative approach with a non-experimental and retrospective longitudinal design was used. The research was based on 72 monthly observations corresponding to the period 2019–2024, obtained from institutional records of the Results-Based Government (GPR) system. The quality of the service was measured through an index that integrates continuity of care, compliance with standards and operational results, while operational efficiency was evaluated based on indicators related to the management of resources and internal processes. The results show that there is a negative correlation between operational efficiency and service quality ( $r \approx -0.31$ ). The linear regression model indicates that increases in efficiency are associated with reductions in quality ( $\beta = -0.486$ ), although the explanatory power of the model is limited ( $R^2 = 0.097$ ). In conclusion, the findings suggest the presence of a trade-off between efficiency and quality, which implies that strategies aimed exclusively at improving productivity could affect certain aspects of service quality. It is recommended to consider multiple organizational factors to achieve a balance between both dimensions.

**Keywords:** Operational efficiency, quality of service, hospital management, public hospitals.

### INTRODUCTION

Operational efficiency and quality of service are persistent challenges in public hospitals (Torres et al., 2025). These organizations operate under budget constraints, high demand for care, and complex regulatory frameworks. In this context, it is expected that the available resources will be transformed into timely and safe services. However, multiple studies show heterogeneous results in hospital performance (Galeas & Sánchez, 2024). This situation raises questions about the effectiveness of current models of public management in health.

In recent decades, hospital management has incorporated results-oriented approaches (Guzmán et al., 2025). Operational management based on quantitative evidence has been emphasized. This approach promotes systematic use of indicators to assess efficiency, productivity and quality. Empirical evidence allows identifying operational gaps and supporting managerial decisions (Tello, 2025). However, its application in public hospitals remains limited and fragmented

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At the same time, public health systems have high levels of administrative compliance. The focus is on budget execution, public procurement and accountability (Álvarez, 2024). These mechanisms strengthen transparency and institutional control. However, the literature indicates that formal compliance does not guarantee improvements in efficiency or quality of care (Bustamante et al., 2025). This empirical gap between compliance, efficiency, and service outcomes remains insufficiently explained (Andrango, 2025).

In this framework, the analysis of specific institutional cases is methodologically relevant. The Valdivia South Day Hospital, located in Guayaquil, is a relevant case due to its operational role and its availability of documentary information (IESS, 2019; Freire & Delgado, 2025; Guzmán & Nader, 2020). The institution has systematic administrative, financial and operational records. This condition allows the development of replicable quantitative analyses. In addition, the hospital faces increasing pressures to improve efficiency and quality of service provided (IESS, 2021).

The general objective of the study is to analyze the relationship between operational efficiency and quality of service in the selected hospital. To this end, a quantitative approach based on institutional documentary information is used. The analysis seeks to identify statistical associations between operational and quality indicators. It is also intended to evaluate the explanatory power of efficiency on service quality. This approach contributes to the empirical evaluation of public hospital management. Consequently, the following hypotheses are proposed: H1, there is a significant correlation between operational efficiency and service quality; H2, operational efficiency significantly explains the variation in service quality.

## LITERATURE REVIEW

### 2.1 Operational efficiency in health services

Hospital operational efficiency is defined as the ability to maximize medical devices using available resources (Fernández et al., 2024). In analytical terms, the literature distinguishes between technical efficiency and operational efficiency. Technical efficiency reflects the input-output relationship under a productive frontier. Operational efficiency incorporates processes, timing, and organizational coordination. Both dimensions are central in hospital quantitative studies (Illusanguil et al., 2024).

Empirical studies use a variety of quantifiable indicators to measure hospital efficiency. The most frequent include bed occupancy, patient turnover, and average length of stay. Staff-per-patient ratios and costs per discharge are also used. Methods such as Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) predominate in the literature. These techniques allow comparisons between homogeneous units (Wu, 2023).

In public contexts, efficiency is conditioned by institutional and regulatory constraints. Studies in Europe show that public hospitals can achieve levels of efficiency comparable to or higher than private ones. However, these results depend on the regulatory environment and financial incentives. Evidence suggests that efficiency does not necessarily imply quality reduction (Mbau et al., 2023). This relationship requires specific empirical analyses.

### 2.2 Quality of service in hospital institutions

The quality of the health service is conceptualized as the degree of compliance with clinical and organizational standards (Mera, 2022). It includes patient safety, effectiveness of treatment, and timeliness of care. In public hospitals, direct measurement of clinical quality is often limited

(Cantos, 2022). Therefore, the studios resort to operational and administrative proxies. These measures allow for comparable quantitative analyses (Palma and Sotomayor, 2026).

The most commonly used quality proxies include rates of associated infections, cancellation of surgeries, and wait times (Gómez et al., 2023). Indicators of satisfaction and avoidable mortality are also used (Cueva et al., 2024). The literature recognizes limitations in these approaches, but validates their use in documentary studies. Its strength lies in its availability and standardization. This is key for quantitative analysis in public systems (Jara, 2024).

The relationship between quality and efficiency has been widely debated. Some studies find positive associations between both dimensions (García, 2023). Others report inverse or non-significant relationships (González et al., 2025). In public systems, quality can improve without immediate efficiency gains. These results reflect the hospital organizational complexity.

### **2.3 Relationship between operational efficiency and quality of service in health**

Empirical evidence shows contradictory results on the efficiency-quality relationship in health (Barraza et al., 2025). Studies in Germany and Australia report inverse relationships between technical efficiency and patient satisfaction (Vrabková et al., 2025).

Other studies identify complementarity between both dimensions (Wang et al., 2024). These differences depend on the method, indicators, and institutional context. There is no uniform empirical consensus.

Various organizational factors mediate this relationship. These include staffing, process management, and technology availability. Pressure for efficiency can induce operational responses of acceleration. These strategies improve productivity, but can deteriorate clinical quality (Granel et al., 2022). Longitudinal studies confirm these effects in public hospitals.

In public systems, institutional incentives also have a significant influence. Organizational fragmentation and administrative control limit efficiency-quality integration. The literature highlights that sustained improvements require strategic alignment (Guccio et al., 2024). Without this alignment, efficiency can become an isolated goal. This pattern has been observed in multiple contexts.

Based on this evidence, this study proposes a conceptual model where operational efficiency acts as an explanatory variable of service quality. The relationship is analyzed using quantitative indicators derived from documentary records. Efficiency is assumed to influence quality, but not in a linear way. This model allows empirically evaluating this relationship in a specific public hospital.

## **METHODOLOGY**

The study adopts a quantitative approach, aimed at estimating the statistical relationship between operational efficiency and service quality through institutional secondary data. A non-experimental design is used, since the variables of interest are not manipulated by the researcher and the results come from administrative records already generated by the institution. Considering the availability of monthly observations, the design is structured as a retrospective longitudinal study, with correlational and explanatory scope. In this framework, the analysis seeks to (i) identify bivariate associations between variables and (ii) estimate the degree to which operational efficiency explains the variability observed in service quality.

The unit of analysis corresponds to the Hospital del Día Sur Valdivia (Guayaquil, Ecuador), considered a unique institutional case within the public health service delivery system. The analysis period covers January 2019 to December 2024, with a monthly frequency (N=72 observations). The database was built from the monthly information of the management reports of the annual operating plan from the results-based governance system (GPR) carried out by the planning area of the institution (GPR, 2025).

The analysis is based on two main variables constructed as monthly indices:

### 3.1 Dependent variable (Y): Quality of service

Quality of service is a multidimensional concept that integrates processes, results and user perception (Ali et al., 2024). The quality of service is operationally defined as a quantitative index of monthly periodicity that integrates three fundamental dimensions. Continuity of care assesses the coherence and follow-up of the therapeutic process over time (Sujan & Habli, 2021); Compliance with standards measures adherence to institutional protocols and regulations (Pereira et al., 2022); and the operational results reflect the clinical and administrative effects derived from the care (Dehanne et al., 2024).

### 3.2 Independent variable (X): Operational efficiency

Operational efficiency is defined operationally as a quantitative index of monthly periodicity that synthesizes the performance of institutional operational and administrative management (Huang et al., 2025). This index integrates dimensions associated with resource planning, the execution of internal processes, the optimal use of inputs and productive capacities, and compliance with performance indicators linked to efficiency. Hospital efficiency implies maximizing the results obtained with the available resources, guaranteeing adequate operational coordination and minimizing waste, in accordance with contemporary approaches to measuring technical efficiency in health services (Walters et al., 2022)

Table 1 shows details of the study variables. The analysis is developed on three levels: descriptive, correlational and explanatory. Measures of central tendency, dispersion and ranges are calculated. Time series are graphically examined to identify trends, seasonality, and potential breaks. To evaluate bivariate associations, Pearson's correlation coefficients are estimated. Linear regression models for ordinary least squares (OLS) are estimated. The basic specification is:

$$calidad_t = \beta_0 + \beta_1 eficiencia_t + \varepsilon_t \quad (1)$$

Table 1. Operationalization of variables

Variable	Operational definition	Periodicity	Role
Service Quality Index (Quality)	Monthly institutional metric that summarizes performance associated with quality/continuity/standards	Monthly	Dependent
Operational Efficiency Index (Efficiency)	Monthly institutional metric that synthesizes operational/administrative performance	Monthly	Independent

Source: Own elaboration

## RESULTS

Table 2 summarizes the descriptive statistics of the monthly indices of service quality and operational efficiency for the period 2019–2024. The number of observations, mean, and standard deviation are reported, which allows the dispersion and stability of each indicator to be evaluated. The results show that quality has greater relative variability than efficiency.

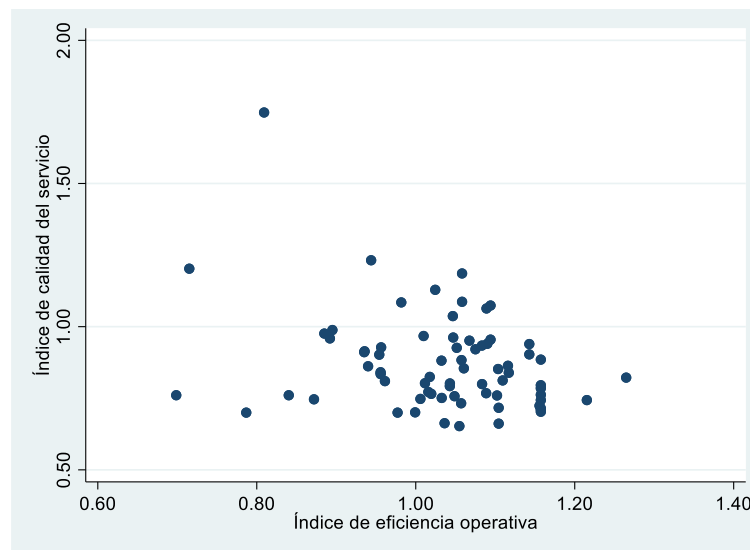
Table 2 Descriptive statistics

Variable	N	Media	Deviation
Quality	72	0,87	0,169
efficiency	72	1,03	0,108

Source: Own elaboration

Figure 1 shows an inverse relationship between operational efficiency and service quality. For 72 monthly observations (2019–2024), the Pearson correlation is approximately  $-0.3115$ . The point cloud shows that efficiency values close to 1.10 are associated with lower quality, while efficiencies around 0.95 tend to coincide with relatively higher qualities. The dispersion of quality (0.169) exceeds that of efficiency (0.108), suggesting greater volatility of quality performance. On average, the quality was 0.87 and the efficiency 1.03 in the period.

Figure 1. Quality vs. Efficiency Dispersion



Source: Own elaboration

Table 3 presents the results of the OLS linear regression model estimated to evaluate the association between operational efficiency and service quality in the monthly period 2019–2024 (N=72). The efficiency coefficient is negative and statistically significant ( $\beta=-0.486$ ;  $EE=0.177$ ), suggesting a trade-off: increases in efficiency are associated with decreases in the quality index. In practical terms, an increase of 0.10 units in efficiency is linked to an approximate reduction of 0.0486 units in quality, keeping the rest constant. The model explains about 9.7% of the observed variation ( $R^2=0.097$ ), indicating limited explanatory capacity and the need to incorporate time controls and robust specifications for monthly series.

Table 3 Linear regression. Quality vs Efficiency

Variables	Quality
Efficiency	-0,486*** (0,177)
Constant	1,373*** (0,184)
Observations	72
R-square	0,097

Note: Standard errors in parentheses  
 p<0.01, \*\* p<0.05, \* p<0.1

### DISCUSSION

The results suggest that, in the monthly period 2019–2024, operational efficiency and service quality do not move in a complementary way but show a trade-off. In line with the H1 hypothesis, a statistically significant correlation is observed between both variables, but with a negative sign, consistent with the estimated OLS slope.

This pattern is consistent with international evidence documenting that efficiency pressures may be associated with impairments in some quality outcomes/measures, although the direction is not universal and depends on the context and the quality indicator.

Regarding H2, the regression indicates that efficiency "explains" part of the variation in quality, but with limited explanatory capacity ( $R^2=0.097$ ). This suggests that quality is captured by multiple factors by a bivariate model (demand, supply, service portfolio, operational shocks, input and personnel constraints), which is expected in public units. In the case of the South Valdivia Day Hospital, the demand pressure is high: in 2024 coverage/care of 354,057 is reported and in 2021 of 428,928, in an establishment that operates 24/7 with critical areas (emergency, imaging, laboratory, operating room and pharmacy) and about 30 specialties. In these environments, "efficiency" strategies aimed at compliance and productivity can stress processes associated with continuity and quality if they are not accompanied by safeguards (supply, clinical safety, queue management, waiting times), as shown by studies that find mixed results and depend on the quality proxy (Palma and Sotomayor, 2026; Gómez et al., 2023;Cueva et al., 2024).

### CONCLUSIONS

Based on 72 monthly observations (2019–2024), the indices present averages of quality = 0.87 and efficiency = 1.03, showing that quality is relatively more volatile than efficiency.

The H1 hypothesis is supported in the statistical sense: there is a significant association between efficiency and quality; however, the evidence points to a negative relationship (-0.31), compatible with a trade-off reading between operating performance and quality performance in the period analyzed.

The international literature reports mixed results and, in several contexts, pressure for efficiency may coexist with tensions over quality/effectiveness outcomes.

The H2 hypothesis is partially supported: the OLS regression estimates a negative and significant effect of efficiency on quality ( $\beta=-0.486$ ), but with low explanatory power ( $R^2=0.097$ ), which suggests that a large part of the variation in quality depends on additional unmodeled factors (demand, inputs, service mix, shocks).

In managerial terms, the central finding does not imply "efficient results", but rather recalibrating indicators and goals to prevent operational compliance from being optimized at the expense of critical quality dimensions (continuity, safety, opportunity), especially in a unit with 24/7 operation and multiple critical areas and specialties such as the South Valdivia Day Hospital.

Methodologically, for more robust conclusions, it is recommended to estimate models with other approaches including more information. Future research should disaggregate the indices into specific operational indicators (sourcing, production, waiting lists, clinical safety) and evaluate mechanisms, so that the institution identifies "levers" that preserve or improve quality, reducing the risk of unwanted trade-offs.

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