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# Physical environment quality and member retention in fitness centres: a quantitative analysis using novel composite indicators in strategic management

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**Abstract.** The physical environment is evaluated for the impact of its quality on member loyalty (construed from satisfaction and retention) within Romanian fitness centres by drawing from a rigorously validated sample of 2,900 participants—refined from an initial pool of 3,314—the research encompasses diverse gym types and demographic segments to assess how factors such as facility cleanliness, equipment condition, and an array of primary ambiance factors that influence member experiences, and, we argue, member loyalty. By utilizing advanced analytical techniques, including Structural Equation Modelling (SEM) and Confirmatory Factor Analysis (CFA), the study confirms the structural adequacy of the measurement model with robust fit indices (CFI > 0.95, RMSEA < 0.05). Power analysis validates the sample size; this is necessary to reveal that cleanliness and modernity significantly enhance satisfaction; their effect on retention is markedly amplified when integrated with positive staff interactions and reliable services. Moreover, correlation analysis highlights the importance of cleanliness and modern equipment ( $r=0.64$ ). Other factors such as facility modernity ( $r = 0.53$ ) and equipment condition ( $r = 0.44$ ) also show substantial correlations with retention rates, suggesting that enhancing the physical environment can boost member satisfaction; however, to effectively promote long-term retention, such enhancements must be combined with other service quality dimensions, particularly staff competence, and communication.

Keywords. fitness, sport management, client satisfaction, quality services in sport, physical exercises.

## 1. Introduction

The physical environment is an unavoidable dimension of the gym experience, and the quality of the physical environment is an often overlooked, albeit essential, component that significantly impacts member satisfaction and retention rates; where clients have numerous fitness options, we assert that while service quality has been extensively optimized, it is now imperative to prioritize the quality of the physical environment in gyms. Such elements (which we modeled into variables) as cleanliness, equipment variety, equipment features, locker room conditions, shower cleanliness, and overall ambiance play crucial roles in shaping clients' perceptions of a fitness center's value and suitability. We examine how specific aspects of the physical environment— such as facility maintenance, equipment variety and condition, and overall ambiance—affect client retention by using data from Romanian fitness centers—a market experiencing growth in health awareness and fitness participation—we aim to provide insights into the impact of the physical environment on member loyalty. This study explores the physical environment as a factor in member retention [1-6] developing and testing composite indicators

within a structural model to provide insights into how fitness centers can improve their environments to better serve their clientele, which is motivated by the fact that previous research has focused on the role of service quality in client satisfaction.

The Romanian fitness market serves as the case study for this research, with recent events highlighting the importance of factors like cleanliness and spatial design in client decision-making processes, and the study uses structural equation modeling (SEM) to model the relationships between physical environment attributes and client retention. This study aims to identify high-yield areas for future research pertaining to the management of fitness centers for the optimization of member retention and to provide fitness center managers with practical insights to improve their facilities, which can be challenging considering the opportunity costs and the complexity of the interdependence of variables.

## 2. Material and Methods

This study employed a stratified probability sampling method [7-10] to investigate the influence of physical environment quality on member satisfaction and retention in Romanian fitness centers. The initial sample comprised 3,314 participants, representing diverse gym typologies and demographic segments. Sampling was based on proportional allocation, mirroring the estimated population density and gym distribution across Romania. To ensure data accuracy, rigorous validation protocols were implemented, including multivariate missing data analysis for incomplete responses and internal consistency checks using Cronbach's Alpha [11-16] with each survey dimension yielding a final value of approximately 0.86. Non-response bias analysis was conducted using chi-square tests to compare respondents with non-respondents. The final subsample consisted of 2,900 participants was curtailed to this size using a hard limit and strict inclusion criteria and demographic homogeneity standards. Post-stratification weighting techniques were applied to correct sampling biases and enhance representativeness. For outlier detection, we used Mahalanobis distance for multivariate outliers and Cook's distance to evaluate individual data points' influence on the model; however, as most primary variables consisted of Likert-scale items, outliers lacked a marked presence, and only compounded variables presented outliers, for which the model was refit accordingly.

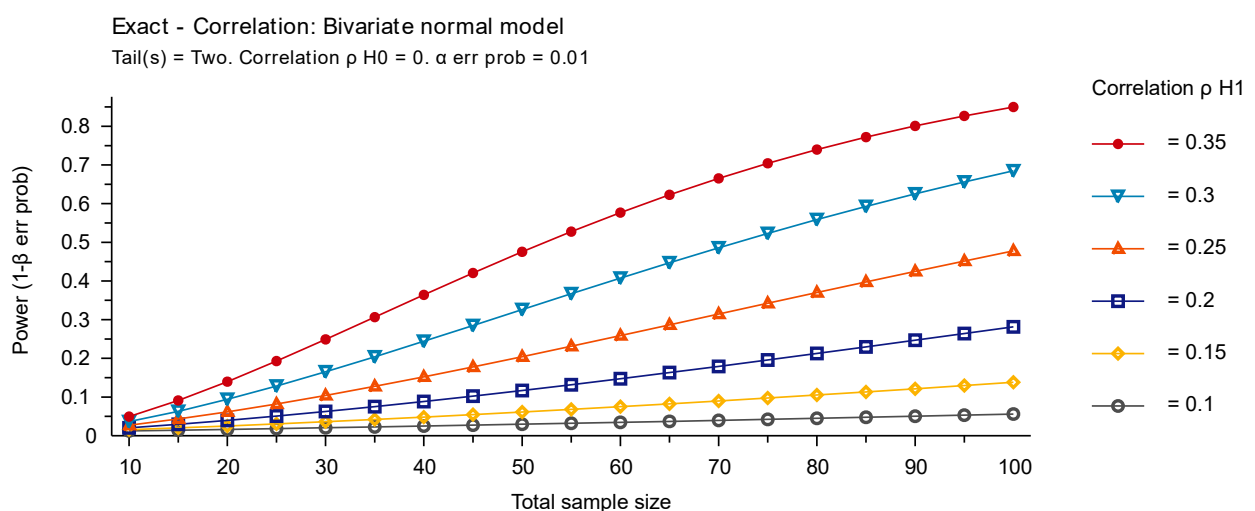


Figure 1 - Power analysis protocol for correlation: bivariate normal model

Power analysis, a key component of the study's methodology [10], [17-19] employed a bivariate average model to evaluate the adequacy of the sample size for detecting correlations between physical environment quality, member satisfaction, and retention. Figure 1 illustrates this analysis, demonstrating that our sample size is more than sufficient, which aligns with the study's methodological rigor in examining the impact of the physical environment on member satisfaction and retention, showing that

the chosen sample size is sufficient to detect meaningful effects, and caters for the unprecedented size and scope of the broader study the current article is a facet of.

The research instrument used was a comprehensive, multidimensional structured questionnaire, developed based on empirically validated constructs from the SERVQUAL [20-26] and SERVPERF [20], [24], [27, 28] frameworks. The questionnaire included 47 items aimed at capturing various aspects of physical environment quality in fitness centers. Responses were recorded using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) to quantify participants' perceptions of service quality and utility. Data collection was conducted online via a secure survey platform, internal consistency was tested with Cronbach's Alpha calculated for each construct, resulting in high-reliability scores ( $\alpha \approx 0.86$ ). Construct validity was further evaluated through Confirmatory Factor Analysis (CFA) [28-33] which produced acceptable fit indices, including a Comparative Fit Index ( $CFI > 0.95$ ) and a Root Mean Square Error of Approximation ( $RMSEA < 0.05$ ), supporting the structural adequacy of the measurement model.

The primary analytical framework employed in this study was Structural Equation Modeling (SEM) [34-39]. This method allowed for the simultaneous examination of multiple dependent and independent variables to explore the relationships between physical environment quality, member satisfaction, and retention indicators. The SEM model estimations were carried out with maximum likelihood estimation (MLE), and model fit was analyzed ( $TLI > 0.95$ ,  $\chi^2/df < 3$ ,  $CFI > 0.95$ ,  $RMSEA < 0.05$ ), indicating robust model to data fit, adding to which, a power analysis was used to ensure adequate statistical power, which, despite the large sample size, remains an issue when modeling secondary and tertiary constructs.

### 3. Results

The analysis revealed, as predicted, a significant relation between key secondary components, such as physical environment quality, member satisfaction and retention rate of fitness centers, with the implication that factors such as the modernity of facilities, cleanliness of spaces, features of the equipment, overall ambiance all model to influence satisfaction level and consumer loyalty.

Higher ratings were recorded for statements such as "Facilities are modern" and "Equipment is in good condition," indicating the importance of such features in the perceptual model of the physical quality of the environment, alongside factors such as music selection, lighting, ambiance, all of which affect long-term retention, creating a pleasant and engaging ambiance that highly correlates with membership duration and member retention ( $r = 0.68$ ). This result is somewhat novel, the implication being that ambiance is more important than expected for optimizing membership retention. Ambiance is a construct of satisfaction with secondary and tertiary features of the physical environment quality and may modelled by supplementary variables that require further research, such as the attitudes of other gym-goers in the shared physical environment. More precisely, a managerial intervention with a focus on improving changing rooms and showers, positive nutrition options, beverage diversity, and operating hours will have a significant impact on member experiences.

Our correlation analysis showed that facility conditions—including modernity and cleanliness—had a moderate positive correlation with general satisfaction (mean score of 3.11, the standard deviation of 0.55), yet these were not the primary drivers of retention but instead served as supportive elements, indicating that while a high-quality physical environment contributes to satisfaction, factors such as staff interactions, perceived quality of service and classes, maybe as impactful as physical environment quality in predicting long-term commitment.

Our research followed an exploratory protocol to identify potential constructs that emerge from primary variables and serve as predictors for retention maximization. Correlation analysis further revealed that facility conditions, including modernity and cleanliness, exhibited a moderate positive correlation with general satisfaction ( $M = 3.11$ ,  $SD = 0.55$ ).

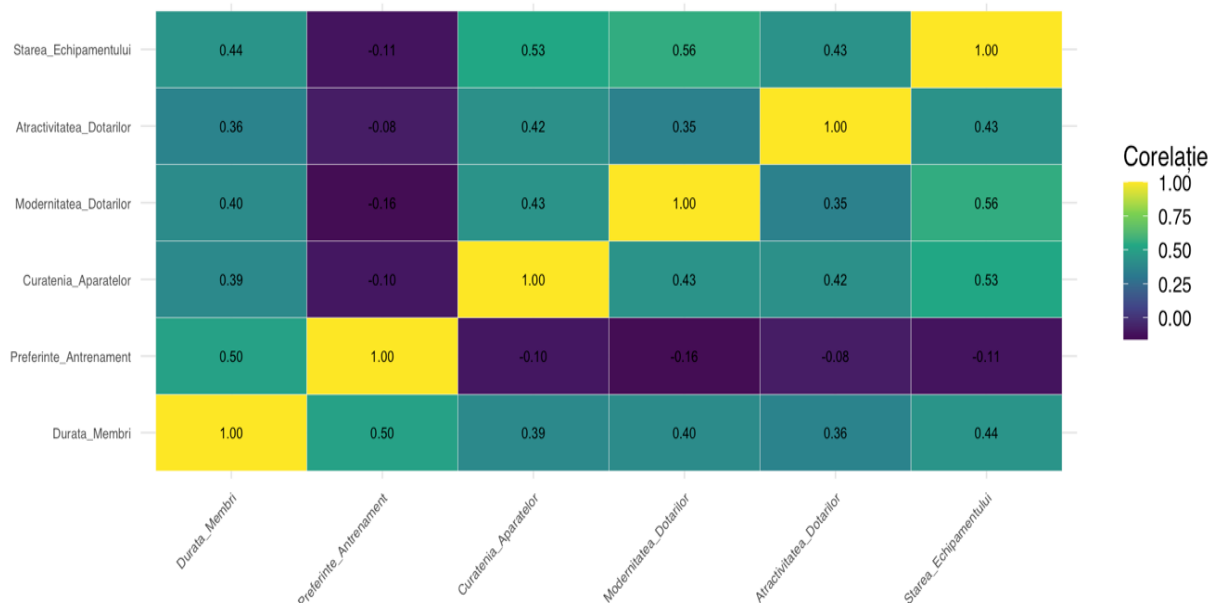


Figure 2 - Spearman Correlation Heatmap of Main Factors Influencing Member Retention

The Spearman correlation heatmap presented in Figure 2 illustrates the relationships between critical physical environment variables and the dimension that model's member retention, a compound variable derived from the adherence duration (time at the gym) in relation to the steadiness of perceptual environment inputs: unaltered physical environment quality. This correlation heatmap showcases the nuanced and subtle nature of the compounding of the primary variables of our study in a coherent model: there are no strong predictors in the primary variables. However, there are strong influences and clustering of primary variables in secondary constructs. Specifically, the heatmap reveals strong correlations between variables "Cleanliness of Equipment" and "Adhesion Duration" with a coefficient of 0.64, as well as between "Modernity of Facilities" and "Adhesion Duration" with a coefficient of 0.53, indicating cleanliness and perceived modernity are essential factors in influencing membership duration, and must be taken into account in our analysis.

A strong positive association between member retention and equipment cleanliness ( $r = 0.64$ ) for equipment cleanliness suggests that gyms that maintain high standards of cleanliness maximize their chances of promoting client membership.

In a similar trend, (Modern Amenities) displayed a lower yet positive correlation coefficient of 0.29, indicating that while modern amenities contribute to member experiences, they play a supplementary role compared to other factors "Attractiveness of Facilities" had a moderate correlation of 0.48 with "Adhesion Duration," and that, "Condition of Equipment" exhibited a positive correlation of 0.44, which is not surprising, as attractive, feature-rich and well-maintained equipment is an expected factor associated with member satisfaction and retention. Additionally, variables "Training Package" and "General Atmosphere" demonstrated positive correlations with member retention, with coefficients of 0.36 and 0.34, respectively, both of which are high-yield managerial insights, that can be

The range of correlation coefficients, spanning from 0.29 for "Modernity of Equipment" to 0.64 for "Cleanliness of equipment", indicates that while various aspects of the physical environment contribute to member retention, certain factors are more influential in fostering long-term gym loyalty, mainly, cleanliness, modernity, and equipment condition emerged as the top retention correlates. For managers, optimizing these areas can directly enhance member satisfaction and loyalty rates, as evidenced by Structural Equation Modeling (SEM), with results that indicate that ambiance and equipment variety both contribute to member satisfaction, albeit their effect on retention is more indirect. This is also not surprising, as a well-maintained facility with modern equipment enhances the overall member experience, but its correlation with long-term retention becomes stronger when combined with positive

staff interactions and reliable services. In short, the physical environment is essential but must be integrated with other dimensions. Staff competence and communication, both being service quality dimensions, are prime examples of what needs to be integrated so as to maximize member satisfaction and retention.

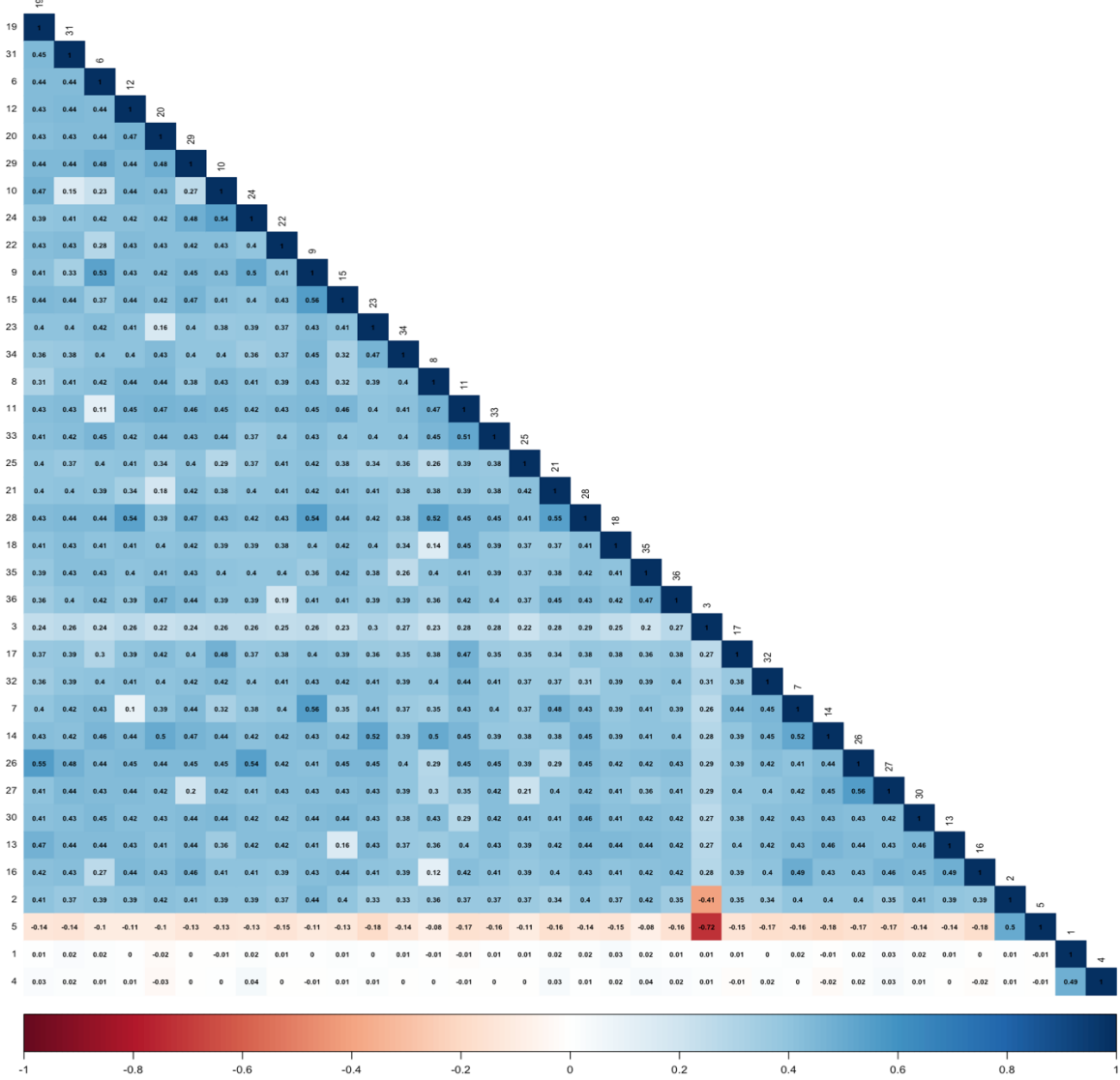


Figure 3 - Indice-based correlation matrix of the data structure

A correlation matrix, constructed to explore observed variables' relational impact, focused on the physical environment quality and its potential impact on member satisfaction and retention in fitness centers, presented in Figure 3 as a heatmap of the correlation coefficients, visually representing both strong and weak associations across different dimensions of the physical environment, member satisfaction, and retention indicators. The color scale ranges from -1 (indicating strong negative correlations) to 1 (indicating strong positive correlations), with darker shades of blue representing stronger positive relationships and darker shades of red signifying stronger negative relationships.

Key observations from the matrix reveal significant positive associations between physical environment quality variables, such as cleanliness (index 15) and equipment condition (index 29), with overall satisfaction (index 31), which highlights the importance of maintaining high standards in the physical environment to enhance member satisfaction; some variables showed weak or negligible

correlations. Clearly, not all environmental factors impact client perceptions and retention in the same way. The correlation matrix helped identify potential multicollinearity among predictors; the overall pattern of correlations aligns with the hypothesis that attributes like cleanliness, equipment variety, and ambiance interact to shape the overall member experience and retention likelihood in fitness centers.

This analysis facilitates a detailed exploration of direct and indirect effects within the tested theoretical model, on the idea that improving physical environment quality can significantly enhance member satisfaction, which, in turn, supports retention strategies in fitness centers, nevertheless, the results indicate that a more comprehensive approach, integrating both tangible aspects (e.g., equipment and facilities) and intangible elements (e.g., staff interactions and communication), is necessary to achieve sustained member retention in a competitive market, and this perspective on service quality highlights the complex interplay between the physical environment, client satisfaction, and retention, which, in their interconnectedness, suggest that fitness centers must consider both the physical and service aspects of their offerings so as to maintain a competitive advantage.

#### **4. Discussions**

Our study underlines the importance of physical environment quality in shaping member satisfaction and retention within fitness centers, demonstrating the interplay between tangible environmental factors and overall service quality perceptions, especially since the analysis supports and extends previous research on the significance of physical factors in customer satisfaction [20] [40-43] revealing that aspects such as facility modernity, cleanliness, equipment condition, and overall ambiance significantly influence how clients perceive service quality. Survey data indicated generally positive evaluations of the physical environment in fitness centers, with elements like modern facilities, equipment condition, and general atmosphere receiving moderate to high ratings. These findings suggest that clients value advanced equipment, yet the aesthetics and cleanliness of the facility are also very important. This aligns with existing literature on service quality, which emphasizes that a well-maintained and appealing physical environment contributes to a professional image and enhances satisfaction levels [44, 45].

Our study also identifies specific areas needing improvement, particularly amenities : changing rooms, showers, and food and drink options, all of which notably impact the overall member experience, while the moderate variability in satisfaction scores for these elements implies that while they might not be the primary drivers of satisfaction, they are still essential components of a comprehensive service quality perception, which highlight the importance of fitness centers considering all aspects of the physical environment in their management strategies.

A critical insight from this research is that physical environment quality has a supportive, rather than primary, influence on member retention. Correlation analysis indicated a positive relationship between factors like facility modernity and cleanliness with general satisfaction ( $M = 3.11$ ,  $SD = 0.55$ ). However, these aspects alone were not the main predictors of long-term retention. This suggests that while maintaining a high-quality physical environment is very important for creating a positive first and continuing impression and enhancing day-to-day experiences, other service quality dimensions are needed to drive retention. Structural Equation Modeling (SEM) results further corroborated this view. This show that the influence of the physical environment on retention is often mediated through its impact on overall satisfaction. For example, while a well-maintained and modern facility improves the immediate member experience, long-term retention becomes more significant when combined with positive staff interactions and reliable service. Our findings align with earlier studies, which advocate for a comprehensive service quality approach, combining tangible and intangible factors to build customer loyalty [46, 47].

These results have practical implications for fitness center management. They emphasize the importance of investments in the physical environment as a key factor shaping client perceptions and satisfaction. However, they also indicate that focusing solely on the physical aspects is insufficient for ensuring long-term member retention. To build a loyal customer base, fitness centers need to integrate their physical environment strategy with staff training programs that enhance communication,

responsiveness, and overall member engagement. This approach addresses both tangible and intangible aspects of service quality more effectively to foster client satisfaction and support long-term retention.

While the current study provides valuable insights, future research could further explore specific elements of the physical environment to identify their individual contributions to client satisfaction. Additionally, examining the interplay between physical environment factors and other service quality dimensions across various cultural contexts or market segments would offer a more nuanced understanding of their effects. Conducting longitudinal studies to track changes in member retention over time in response to targeted improvements in the physical environment would also yield actionable strategies for fitness centers looking to enhance customer loyalty and business performance.

Our research highlights the critical importance of the physical environment in shaping customer perceptions of service quality. Integrating this factor in decision making at a managerial level allows fitness center to refine their service management tactics, adopting this strategy offering them options in meeting their clients' expectations, which, in effect, set a solid foundation for success and strategic planning: forecasting client loyalty becomes more reliable.

## **5. Conclusion**

This study evaluates the emerging role of the physical environment in influencing client satisfaction and retention within fitness centers through a comprehensive analysis employing composite indicators and a strategic management perspective, our research substantiates those elements such as facility modernity, cleanliness, equipment condition, and ambiance are integral contributors to members' overall perceptions of service quality. It has become apparent from our study that while the setting itself is not the only factor in keeping clients engaged, it plays a critical role in enriching their overall experience, which is the driving factor of loyalty. and laying the groundwork for their satisfaction.

There is a noticeable positive link between the caliber of these physical spaces and client contentment, which, in turn, indirectly bolsters retention by elevating the general level of satisfaction, a result that, while not surprising in itself, is perhaps valuable in the way it contributes to limiting how easily overlooked it may be in practice.

Our research highlights the importance of melding superior physical conditions with other dimensions of service quality, such as staff expertise, positive engagement, clear communication, and prompt service, to nurture the right ambiance that can develop an enduring customer allegiance.

From a strategic management standpoint these results and insights offer fitness centers a comprehensive framework for enhancing customer loyalty by investing in the physical environment, which is essential, and complementing it by initiatives that focus on staff training, member interaction, and service responsiveness, which is why by embracing an all-encompassing approach, a strategy that strikes a balance between the apparent and the subtle elements of service quality, fitness centers can more adeptly align with their clients' evolving preferences.

Our research adds to the wider discourse on how adept management of physical environment quality can significantly uplift client satisfaction and foster retention in the ever-changing landscape of the fitness industry.

This approach aids in solidifying long-term relationships and provides a competitive edge in the growing fitness market, with future research directions could include investigating the relationship between physical environmental factors and other aspects of service quality in different market segments and cultural settings. Also of interest is studying the lasting effects of specific enhancements to the physical environment on customer retention, exploring the integration of digital technologies to enhance or complement the physical setting of fitness centers could yield insightful discoveries, the necessity of adopting a holistic approach to evaluating service quality within fitness centers, with a special focus on the physical environment as a key factor in fostering lasting relationships with clients and, as the fitness industry evolves, understanding and refining the role of the physical setting becomes increasingly critical for maintaining business success over time. The findings discussed here offer valuable insights for managers and stakeholders of fitness centers, providing a deeper comprehension of the complex



interplay between the physical environment, customer satisfaction, and ongoing loyalty in the highly competitive realm of the fitness sector.

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