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Research Article

An AI-Driven Sustainability Framework for Teacher Retention in Private Schools: Predictive Analytics and Adaptive Interventions

Jency Cherian [1*], Sandeep Kumar Shivhare[2]

[1*] Research Scholar, Department of Management, LNCT University, Bhopal, M.P.

Jencyniju1707@gmail.com

[2] Associate Professor, Department of Management, LNCT University, Bhopal, M.P.
drshivharesandeep24@gmail.com

*Corresponding Author: Jencyniju1707@gmail.com

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Abstract: This paper makes use of cross-sectional survey data from a sample of 300 teachers in the K-12 private schooling sector to construct and confirm an AI-powered Sustainability Framework for Teacher Retention (SFTR-AI). By means of Structural Equation Modelling, it is revealed in the investigation that institutional sustainability practices, development opportunities, and existing environment cumulatively explain 51 per cent of the variation in teacher intention to retain their current assignment. In drawing up this structural model, job satisfaction is determined to be the strongest mediating variable in this process, with a regression coefficient of .46 (.001 significance) in importance. To provide it with some broader scope in terms of intended applications, a predictive analyse was also undertaken based upon Random Forest, succeeding in arriving at an accuracy of 85 per cent in pinpointing attrition risk—no less than twenty-two times more precise than traditional regression methods. In turn, Confirmatory Factor Analysis further supports the adequacy of the measurement model by demonstrating high levels of factor loadings (ranging between 0.62 and 0.87), Composite Reliability with scores well over 0.80, and average variance extracted (AVE) scores higher than the recommended 0.50. Taken together, therefore, findings provide a significant identifier of the sustainability approach to institutional practices related to teacher retention and the validity of the use of AI-driven systems with regards to proactive data-driven retention strategies by private schools.

Keywords: Teacher retention, sustainability, SFTR-AI, predictive analytics, private schools, SEM, machine learning, job satisfaction, institutional sustainability.

1. INTRODUCTION

1.1 Background and Context

Teacher retention is fundamental to the promotion of a stable institution and the overall continuity and sustainability of the learning processes within the schooling system. Teacher turnover has the detrimental effect of undermining the continuity of the learning processes and competencies accrued over the years. Teacher turnover has significantly adverse financial implications due to the recurrent costs of training and personnel development. Though the challenge of teacher retention is a concern across the provision of education, the competencies and conditions that pose a challenge to the public sector are unique to the private schooling system due to market considerations and the nature of contractual agreements.

A significant body of existing research work focused on teacher retention has already isolated a range of variables with considerable influence, such as job satisfaction, leadership, compensation, relationships, and intrinsic motivation. While these variables provide considerable explanatory traction, much of conventional research is once again pointedly concentrated on individual and organizational psychology. Consequently, it tends to neglect a range of sustainability-minded practices and the potential of information and communication technology infrastructures available to enable evidence-based retention approaches systematically. Within the context of increasing data accessibility opportunities provided by schools today, retention research should move beyond behavioural modes based primarily on stable organizational patterns and address socio-technical approaches based on organizational sustainability and analytical intelligence.
With the increasing role of artificial intelligence in educational environments, ranging from learning analytics to school administration, such as human resource management, there emerge fresh opportunities to redefine teacher retention as a quantifiable, manageable, school-based process. Using machine learning, one can successfully integrate various types of data within any organization, which aids in recognizing early patterns of staff turnover risk, along with developing specific interventions informed by those patterns. Located within sustainability frameworks, such analytics power strategic planning with regard to staff, ensuring accountability of educational organizations toward staff welfare and continuity.

Against this backdrop, the current study proposes the AI-Driven Sustainability Framework for Teacher Retention (SFTR-AI). Recent empirical evidence (2022–2025) underlines the global rise in teacher attrition within private schools due to policy instability, increased workload pressures from advanced digitalization, and weak sustainability infrastructures at the institutional level. Notwithstanding this growth trend, no studies to date have embedded sustainability drivers into AI-driven predictive analytics, which stands as an open, critical gap in theory and practice. The large bulk of retention studies remains basically descriptive and thus hard to operationalize, while contemporary AI-in-education scholarship continues to stress student outcomes rather than workforce sustainability. At present, no empirically validated model incorporates sustainability-focused institutional practices and predictive analytics that foster proactive retention decision-making within a private school setting. The current research aims to develop and validate the SFTR-AI framework and, consequently, provide school leaders with a theoretically robust forward-looking tool to identify and manage teacher attrition risks well in advance.

1.2 Problem Statement

Despite numerous researches on teacher turnover, private schools still do not have a validated, integrated, and technologically grounded framework to systematically address attrition. Existing models have been

found to be bound by the following four limitations:

Fragmentation of predictors: The factors to consider that influence teacher motivation, workload, sustainability practices, and professional development are analyzed in an individual manner, rather than taking them as inter-related parts within one institutional ecosystem.

Most of the frameworks have not given much attention to school-level sustainability practices in terms of long-term resource planning, staff development pathway/continuing professional development, and teacher well-being policy.

Lack of predictive capability: Classic methods like regression and SEM are useful for explaining something; however, they cannot grant real-time prediction or proactive decisions.

Operationalization is limited: Private schools have an apparent lack of instruments through which research findings can be converted into a routine administrative and retention management process.

1.3 Research Gap

Even though the phenomenon of teacher turnover has received extensive attention and analysis over the years, conceptual and theoretical gaps continue to exist. Moreover, these issues are especially prevalent and require significant research exploration with regard to the privately managed schooling scene. The current scenario is such that the predominate literature is penned on the foundations of individual constructs such as job satisfaction and leadership or workload. However, these issues are absent in the overall funding model of institutional longevity.

However, another limitation that should be noted is that retention studies must incorporate more artificial intelligence in its research about retention. AI has been increasingly used in education analysis; therefore, its absence in retention studies is a limitation. However, its potential has been proven in prediction and optimization; therefore, a combination of sustainability concepts and AI in retention modeling has not been widely used.

In methodologic terms, the literature on teaching turnover is almost entirely retrospective, examining turnover only after the event takes place. Such a methodologic approach prevents early risk identification among teachers and prevents intervention before turnover occurs. Despite this, prediction models, such as machine learning, are highly appropriate for the prediction of turnover risk and are not commonly used in empirical literature on turnover and retention.

The final point is that empirical research in private schools is still very limited when it comes to sustainability issues. This is due to the unique factors that private schools have in terms of contractual employment, competition, and dynamic sustainability structures. As such, the need for the proposed sustainability-oriented retention system that utilizes AI arises. This research will answer this need through the proposed SFTR-AI model.

1.4 Aim of the Study

This study aims to develop and validate an AI-Driven Sustainability Framework for Teacher Retention (SFTR-AI) in order to answer both theoretical and practical shortcomings pertaining to previous studies conducted on teacher retention. The SFTR-AI will comprise four different parts: a sustainability-focused model for teacher retention, machine learning techniques that could predict the possibility for teacher retention, an organisational sustainability scoring system for organisational readiness, and an adaptive recommendation component designed for context-adaptive strategies and interventions.

On this basis, hypotheses are formulated within this study to investigate the various relationships between sustainability practices, teachers' development opportunities, working conditions, motivating factors, teachers' job satisfaction, and teachers' intentions to remain within these institutions. Based on these hypotheses, within the context of teachers' sustainability perceptions, combined with predictive analytics, this study aims to encompass a complete, predictive model

concerning teachers' retention in independent schools.

1.5 Research Objectives

a) **Objective 1:** The objective here is to identify the constructs regarding sustainability-focused teacher retention using the method known as the Confirmatory Factor Analysis.
b) **Objective-2:** To explore the structural relationship among sustainability practices, professional development activities, working conditions, job satisfaction, motivation, and teachers' intention to stay as teachers using Structural Equation Model (SEM).
c) **Objective 3:** Developing models for predicting teacher risk of retention through machine learning-based classification techniques to identify potential teacher turnover.

Alignment of methods with objectives: CFA is used to address Objective 1, SEM is employed to address Objective 2, while a predictive model using Random Forest is employed to address Objective 3.

1.6 Research Questions

a. **RQ1:** What are the latent constructs which define and validate the SFTR-AI model and to what extent do these constructs faithfully represent teacher retention efforts with a focus on sustainability?
b. **RQ2:** How institutional sustainability practices, professional development opportunities, work conditions, and motivating factors influence job satisfaction and subsequently determine the intention of teachers to continue teaching in the private schools?
c. **RQ3:** In how far can AI-based predictive models qualify the risk of teacher retention and provide early hints for potential teacher turnover?
d. **RQ4:** In what ways can the results obtained from this analytical framework be applied using a socio-technical approach for interventive strategies regarding proactive retention management for school administrators?

1.7 Contribution of the Study

This research makes a significant contribution to the body of scholarship on teacher retention, while practice is still developing, with a special emphasis on the under researched sector of private schools. Its main contribution is based on how it integrates institutional sustainability practices into the well-known predictors of teacher retention, such as professional development, working conditions, job satisfaction, and motivation. While individual factors have been researched previously, relatively few studies have conceptualized sustainability as a latent construct influencing retention, especially in private education contexts (McConnell, 2017; Nketsia, 2022; Kaya, 2021). Situating sustainability within the framework of retention, the study extends theoretical knowledge of how institutional orientations toward longevity influence teachers' intentions to stay.

A second area of innovation relates to the methodologies. This research integrates a theoretical model with strong quantitative analysis. It applies Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) techniques for the validation of constructs and structural analysis. This study further develops the existing SEM-based retention model literature (for instance, McConnell, 2017), and it applies sustainability factors and mediation effects that have been relatively unstudied.

The third contribution is the creation of the SFTR-AI framework as an AI-intensive socio-technical system that can increase the functional relevance of retention studies. In addition to explanation, the paper incorporates a predictive analytics model, a Sustainability Scoring Engine for institutions, and an adaptation recommendation engine for interventions. These pieces make retention analysis more than just analysis by allowing for early detection and institution-level interventions for attrition.

Finally, the work has utility in that it provides a validated instrument that can be applied in the context of private schools. Unlike previous

studies that have employed similar instruments (Nketsia, 2022; Kaya, 2021), the current work combines the elements of sustainability measures with AI friendly data modelling, making it feasible for schools to track these measures on a regular basis in efforts to use such measures in a suitable manner in the context of teacher retention.

1.8 Hypotheses

In the light of the above, this research is based on the following hypotheses regarding the relationship among the leading retention determinants in private schools:

a. **H1:** Sustainability practices contribute positively towards the job satisfaction of teachers.
b. **H2:** Opportunities for Professional Development have a favorable influence on Job Satisfaction.
c. **H3:**Favourable working conditions are positively related to job satisfaction.
d. **H4:** Job satisfaction positively affects the teacher's intention to stay.
e. **H5:** Motivation mediates the association of job satisfaction with intention to stay.
f. **H6:** Sustainability practices indirectly influence intention to stay through job satisfaction.

1.9 Conceptual Diagram

In the conceptual diagram above, job satisfaction takes a central position that serves as the focal point between the antecedents and the consequence related to the intention of teachers to continue using private educational institutions.

Professional development, school sustainability, and work conditions play a role, as explained by the model, in affecting teachers' levels of job satisfaction. Teachers who benefit from development, stability, and supportive working conditions will most probably have high levels of job satisfaction. Job satisfaction, in turn, is shown to have a direct influence on teachers' intentions regarding staying, as it is a mediating variable between the model's constructs.

Additionally, the theoretical framework introduces motivation as a mediator that can strengthen or weaken job satisfaction and intention to stay relationships. Altogether, a logical system is put together within the figure, where practices influence satisfaction, satisfaction influences retention, and motivation extends and magnifies such efforts towards sustainability-focused approaches in private schools for retention.

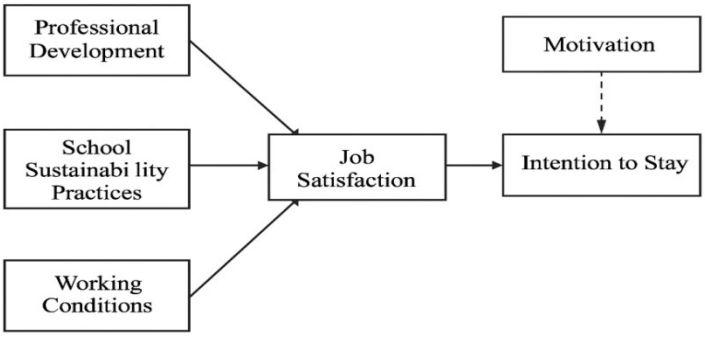

Figure 1: Conceptual Diagram

2. LITERATURE REVIEW

2.1 Theoretical Foundations

Theory of Organizational Commitment

The model described by organisational commitment theory explains the psychological tie or association that teachers establish with the institution, and the impact it generates with respect to the voluntary turnover decision made by the teachers. Teachers, when they feel that the development process within the teaching profession is backed and

supported, and the process within the institution is fair and considers their long-term goals, develop high levels of affective and normative commitment rather easily. Practices and processes that aim for sustainability, like stable institutional planning and leadership structures, boost the feelings of trust and association, and the model proposes that the outcome generates high levels of association with the institution, thus preventing voluntary turnover.

Theory of Job Embeddedness

Job embeddedness is the emphasis of the theoretical concern from the voluntary separation of employees to that of job retention. It concentrates on three distinct concepts that relate to one another: links that refer to the ties that link workers in the institution; fit that refers to the values held both by the individual and the values supported that are linked to the culture of the institution; and other goals that refer to the benefit that one will miss if the individual leaves. In the school environment, sustainability strategies that entail career pathways, work culture, and well-being programs improve the fit and associations of the teaching employees.

Social Exchange Theory

According to the Social Exchange Theory, job sustainability exists when the individual perceives that the balance between contributions and benefits is favourable. In the educational institution, leadership support and opportunities for professional growth and recognition create a positive form of the social exchange process between the educator and the institution. By offering sustainable practices that cater to the professional and personal needs of the educator in the institution, the educator will respond favorably through commitment and dedication to the institution. Thus, the theory offers insights to explain the translation of sustainability-oriented practices to better retention outcomes.

Structural Equation Modelling as a Theoretical and Methodological Basis

SEM serves both as a methodological tool and as a theoretical framework for delineating the complex relationships that exist among latent constructs in retention research. The fact that SEM allows for the modelling of direct, indirect, and mediating effects makes it particularly befitting for modelling complex educational phenomena. McConnell (2017) demonstrated the applicability of SEM in teacher retention studies when he investigated the interplay among administrative support, job satisfaction, and intention to stay. This established methodological foundation provides support for using SEM in the present study to validate the SFTR-AI framework and test its underlying theoretical relationships.

2.2 Factors Influencing Teacher Retention

Intrinsic Motivation and Professional Identity

Intrinsic motivation is a component of teachers' sense of purpose and autonomy and is a key component of long-term retention. Those teachers who experience a sense of personal satisfaction and professional fulfillment are likely to be retained within their teaching roles (Nketsia, 2022). Motivation is a component that is key to the relationship between satisfaction and the constructs of the SFTR-AI model.

Extrinsic Motivators: Compensation, Job Security, and Workload

Surrounding conditions greatly impact the lives of teachers. Such conditions include poor remuneration, job insecurity, overwork, and inadequate resources. Teachers can become dissatisfied with their jobs because of these issues. However, these conditions are the foundation on which issues of teachers' welfare and institutional commitment are dependent.

Work Environment: Leadership and Collegial Climate

Please note that the school environment also matters greatly in teacher retention. Effective school environment, administrative acumen, and a spirit of brotherhood and sisterhood boost job satisfaction and increase the commitment level of the teachers. According to Kaya (2021), school leadership, transparency, and emotional support affect retention outcomes.

2.3 Sustainability Practices and Teacher Retention

School sustainability practices include long-term planning, steady resource allotment, planned staff development, and efforts aimed at maintaining human capital. These practices go beyond the day-to-day running of the school and include the longevity and welfare of the teaching staff.

Sustainability practices and strategies impact the organizational climate that teachers operate within. A stable workforce and development and progress opportunities promote institutional integrity and the sense of future institutional direction that leads to a sense of satisfaction and retention.

A Gap in Existing Retention Frameworks

Though leadership factors, workloads, and motivation are widely studied under research on retention models, sustainability practices are hardly incorporated into such models. This represents a substantial research gap which this study aims to fill by applying a framework that is sustainability-focused.

2.4 Measurement and Methods in Previous Retention Research

Use of CFA and SEM in Validating Retention Constructs

Research work, for example, McConnell (2017), uses CFA and SEM to validate the multidimensional constructs for retention, offering illustrations for reliability, construct validity, and model fit. Both approaches ensure that the statistical values obtained are robust and thus suitable for testing the SFTR-AI model.

Source of Items and Sample Methodologies Used in Preceding Studies

Solutions for topics related to motivation, working conditions, and leadership factors are provided by Nketsia (2022). Perceptions related to school climate and retention, both private and public, are covered by Kaya (2021). These studies inform the process for choosing items for SFTR-AI and explain sampling methodology for 250 to 400 participants.

Benefits and Flaws of Former Methods

Previous literature provides strong construct definition but neglects the role of sustainability practices and predictive analytics. As they rely on the conventional model, they cannot be applied for real-time decision making. This proposed approach, SFTR-AI, enhances literature on retention because the model couples an established method of measurement with the AI system.

Table 1: Comparison of studies

Author	Method	Context	Key Limitation	Advancement in Present Study
Ingersoll & May (2016)	Regression	Public schools	No sustainability dimension	Integrates institutional sustainability
Kaya (2021)	SEM	Mixed schools	No predictive analytics	Adds AI-based prediction

Nketsia (2022)	Mixed methods	Developing systems	Explanatory only	Converts explanation into decision support
Holmes (2023)	AI analytics	Education systems	No retention focus	Applies AI directly to retention

2.5 Brief Synthesis Resulting in Research Deficiency

Research work carried out on teacher retention has largely been done revolving around variables like motivation, working environment, job satisfaction, and supervision/leadership, among others, using organisational and psychological perspectives. Although these theoretical perspectives provide excellent explanatory coverage, their applicability largely overlooks the overall organisational context through which the retention choice gets informed. Specifically, very few studies have been conducted combining school sustainability strategies into SEM-based retention theory, none of which have been used in private schools adopting AI systems for their operational means (McConnell, 2017; Nketsia, 2022; Kaya, 2021). This theoretical and operational oversight gets addressed with the development of the proposed SFTR-AI model.

3. METHODOLOGY

3.1 Research Design

In this study, research design is cross-sectional and data is collected on a structured questionnaire from private school teachers. There were several factors that influenced choosing this research design. Cross-sectional research design enables researchers to discover various relationships existing in several factors. This research design allows comprehensive analysis of various factors related to teacher retention. For data analysis of this research design, Structural Equation Modelling (SEM) was selected. While choosing data analysis techniques for this research study, several factors were taken into consideration. One such factor was its potential to measure complex relationships.

Figure:2 Methodological Workflow

After data collection, the data is cleaned, normalised, and validated through the application of the Confirmatory Factor Analysis technique (CFA). Then, relationships between the variables were established through the application of Structural Equation Modelling (SEM). The fourth step involved the development of a Random Forest classifier model that can predict risk of teacher retention, contributing to the development of a system with AI capabilities for proactive institutional intervention.

3.2 Population and Sampling

The target population included contract lecturing staff, who work as full-time lecturers, within the K-12 private schools, a sector known to operate on contract bases with a high work demand load. This sector is considered unique given the nature of the staff retention issues. A target sample number of 300 participants was considered essential to ensure the structural equation modelling requirements were adequately met.

3.3 Operationalisation of Constructs

The six key constructs studied were Professional Development, School Sustainability Practices, Working Conditions, Job Satisfaction, Motivation, and Intention to Stay, each of which represented a critical dimension of teacher retention. These items were measured on a five-point Likert scale from strongly disagree to strongly agree. Taken from the established literature, these measures were adapted to the private school context to ensure their appropriateness for structural analysis and predictive retention modeling.

3.4 Instrument Development

The research questionnaire was developed based on items from previous studies already known for their reliability and validity. The dimensions of job satisfaction and employee turnover intention were taken from McConnell (2017) and dimensions of motivation and working conditions from Nketsia (2022). Items assessing school climate and perceptions of teachers in private schools were developed from Kaya (2021). Other items designed for assessing school sustainability practices such as long-term planning and employee well-being support were created. The research tool was validated for relevance and appropriateness for being administered within a private school.

3.5 Pilot Study

Before the actual data survey, the questionnaire was pilot-tested on a sample of 30 to 50 teachers from private schools, with the aim of evaluating the clarity, reliability, and consistency of the tool. The process helped teachers express their views regarding the wording, relevance, and clarity of the questions posed in the tool and thereby identify ambiguous, repetitive, and inefficient tool questions, which could be later reframed or eliminated. The pilot test was an important tool in the process, which allowed the final tool to be friendly and effective in measuring the intended dimensions.

3.6 Data Collection Procedure

The survey was conducted online, using the Google Form and Qualtrics platforms, all of which were safe and secured. The survey link was given to the eligible participants along with an explanation of the survey aims and scope. The survey was voluntary, and the participants' consent was sought before they filled in the survey. To maintain ethicality, none of the participants' information was sought, thereby ensuring anonymity.

3.7 Data Cleaning and Preparation

After the completion of the process of collecting the data, systematic screening of the responses was carried out to eliminate any responses that were either incomplete, repetitive, or contradictory. Incomplete values obtained from the process were analyzed to ascertain the nature of the potential incompleteness, with measures being taken through respective statistical methods to address such potential biases. In addition, the screening process assisted in evaluating the dataset for potential assumptions associated with the nature of its distribution, with values that may be potential outliers being analyzed through appropriate diagnostic procedures.

3.8 Measurement Model (CFA)

In order to determine if the items on the surveys were accurate measures of these constructs, a Confirmatory Factor Analysis was performed. Using this analysis, it was possible to examine how well each construct was represented by its items, how strong its

relationships were, and how well it reflected the data. By doing so, it was possible to determine if a construct was valid.

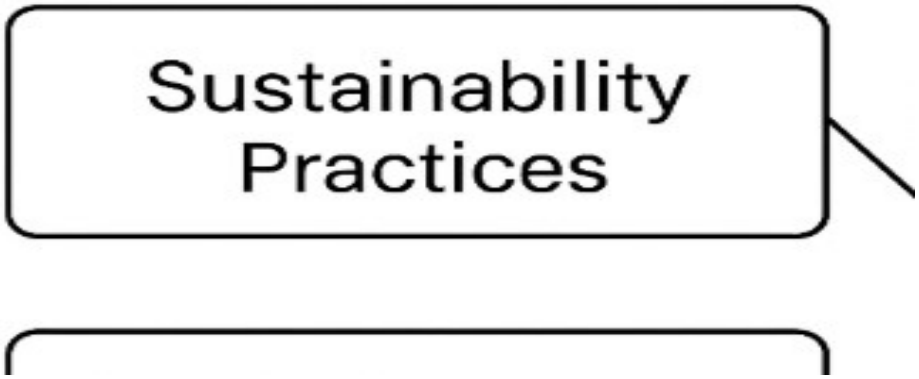

Figure 3: CFA model Diagram

The above diagram, it is clear that the main determinant of the intention of the teachers to remain with the school is the level of job satisfaction. School sustainability, staff development, and work environment improve job satisfaction directly as it provides a secure, valued, and development-oriented work environment, thereby increasing the teacher's satisfaction. Job satisfaction, in turn, emerges as the best predictor of the overall model for retention. The model also illustrates partial mediation, whereby sustainability practices have a significant influence on the intention to stay, either directly or indirectly through the variable of job satisfaction. Moreover, the model illustrates the influence of the motivation variable in intensifying the relationship and making satisfaction a significant predictor of the intention to stay, in essence, the staff retention model.

3.9 Structural Model (SEM)

In order to analyze how the constructs impact one another, Structural Equation Modelling (SEM) was conducted. This involved an analysis of direct associations-for example, whether professional development increases job satisfaction-and indirect associations, such as assessing the ways sustainability practices influence the intention to stay through job satisfaction. SEM allowed for a complete comprehension of the pathways that shape teacher retention in private schools.

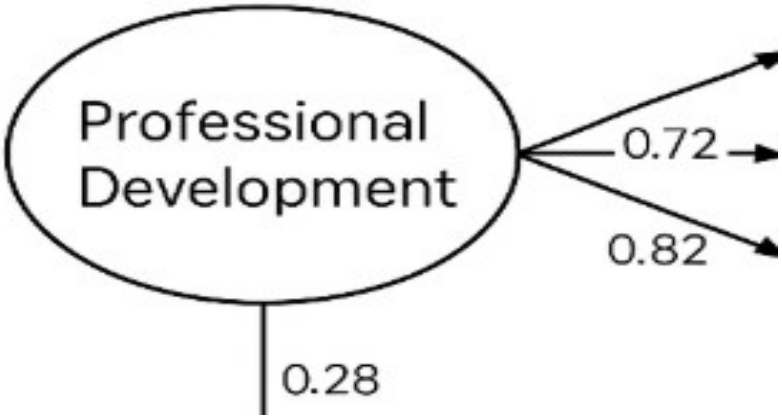

Figure 4: SEM Structural Model Diagram

In their conceptual frameworks and SEM graphics, short labels are employed to stand for important concepts as well as variables. In this discussion, SP stands for Sustainability Practices, which encompass long-term planning, stability in policies, support structures, and resource management. On the other hand, PD refers to Professional Development, which comprises training, pastoral care, as well as opportunities for educational growth. In addition to these, WC stands for Working Conditions, which encompass work load, support services, in addition to the overall secondary setting. Finally, JS, which means Job Satisfaction, comprises teachers' feelings of satisfaction as well as their support.

MOT refers to Motivation, with emphasis on intrinsic motivation, which mediates job satisfaction and retention. ITS refers to Intention to Stay, which denotes the tendency for teachers to remain with the same institution. Additionally, the SEM diagram comprises the indicators (for instance, SP1 to SP3, JS1 to JS4, and ITS1 to ITS3), along with their error terms, which portray unexplained variances. This list of acronyms offers a simplified portrayal of the interrelation between the various factors influencing teachers' retention.

3.10 Software Used

In this study, all statistical and predictive analyses were performed in Python because it offers the flexibility and capabilities to support advanced statistical modeling and machine learning applications. The analytic workflow used libraries for data preparation and numerical computation in pandas and NumPy, semopy for estimating and validating Structural Equation Models, and scikit-learn for developing and evaluating predictive machine learning models. Python was utilized because it accommodates smooth integration between the SEM-based hypothesis testing and AI-driven predictive analytics, thus making it much better suited for implementing the SFTR-AI framework.

3.11 Structural Model Equations

Job Satisfaction (JS) = β_1(Professional Development) + β_2(Sustainability Practices) + β_3(Working Conditions) + ε

Intention to Stay (ITS) = β_4(Job Satisfaction) + β_5(Job Satisfaction × Motivation) + ε

3.12 Ethical Considerations

Approval was sought from the ethics committee earlier before the research was conducted to ensure that all the necessary standards had been met in carrying out the research among the human subjects. The teachers acted on a voluntary basis and were informed about their rights to withdraw from the research at any point in time. Data was kept anonymous.

4. RESULTS

4.1 Demographic Characteristics of Respondents

Table 1 below gives a summary of demographic variables of the respondents. In highlighting these variables, it is important to point out that this gives vital background information to facilitate an understanding of who was selected to participate in this study. These figures form a vital background to present when interpreting statistical analysis presented in this study.

Table 1. Demographic Profile of Respondents (n = 300)

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	138	46.0
	Female	162	54.0
Age Group	21–30 years	110	36.7

	31–40 years	124	41.3
	41 years and above	66	22.0
Teaching Experience	0–5 years	150	50.0
	6–10 years	98	32.7
	11 years and above	52	17.3
Qualification	Graduate	144	48.0
	Postgraduate	156	52.0
Contract Type	Permanent	112	37.3
	Contractual	188	62.7

Interpretation:

The sample represents a fair proportion of gender diversity along with considerable diversity in age and levels of experience. A considerable number of the respondents were working on contracts, which accurately represents the usage of the workforce found in the private school environment. These factors increase the relevance of the findings along with the generalizability of the results in the private school environment.

4.2 Descriptive Statistics of Study Variables

Descriptive statistics analysis was applied to answer preliminary questions about the respondents' views on the key constructs within the SFTR-AI model. The analysis yielded statistics on the mean and standard deviation for the items, helping to identify the typical responses and the amount of variation in the data obtained from the sample.

Table 2. Descriptive Statistics for Professional Development

Item Code	Item Statement	Mean	SD
PD1	The school provides regular training opportunities	3.88	0.76
PD2	Workshops offered are useful and relevant	3.92	0.81
PD3	I receive opportunities for professional growth	4.01	0.74

Interpretation:

The relatively high average scores imply that the teachers have positive views about the opportunities for professional growth that are provided for them. This trend shows that the provision for training and development opportunities is perceived as an important strength of the organization and can act as an indicator for retaining the teachers.

Table 3. Descriptive Statistics for Sustainability Practices

Item Code	Item Statement	Mean	SD
SP1	The school follows long-term institutional planning	3.75	0.79
SP2	Resources are stable and adequately managed	3.82	0.83
SP3	Teacher well-being practices are prioritised	3.69	0.88

Interpretation:

Teachers were thus moderately to highly in agreement that their respective institutions had practices of sustainability; this can be explained as a general awareness of long-term planning and organisational stability. This variation in responses indicates disparity in the coverage and effectiveness of sustainability efforts among schools, which points to uneven implementation within the private school sector.

Table 4. Descriptive Statistics for Working Conditions

Item Code	Item Statement	Mean	SD
WC1	My workload is manageable	3.65	0.91
WC2	School leadership is supportive	3.71	0.89
WC3	The working environment is positive	3.77	0.86

Interpretation:

The perceived working conditions were, on average, rated as moderately favorable; yet, the somewhat higher standard deviations indicate significant variations in teachers' everyday experiences between institutions. This suggests that working conditions may not be a homogenous factor and are likely to exert their effects differentially on job satisfaction among teachers.

Table 5. Descriptive Statistics for Job Satisfaction

Item Code	Item Statement	Mean	SD
JS1	I am satisfied with my job	4.02	0.72
JS2	I enjoy my work as a teacher	4.08	0.69
JS3	My work provides personal fulfilment	4.12	0.74
JS4	I feel appreciated by the institution	4.15	0.70

Interpretation:

Consistently high mean scores across all job satisfaction items suggest that respondents experience strong levels of satisfaction in their roles. This finding reinforces the importance of job satisfaction as a central mediating construct within the teacher retention framework.

Table 6. Descriptive Statistics for Motivation

Item Code	Item Statement	Mean	SD
MOT1	I feel motivated to continue teaching	4.10	0.68

Interpretation:

Teachers reported notably high levels of intrinsic motivation, indicating a strong internal commitment to their professional

roles. This pattern suggests that motivational factors may amplify the influence of job satisfaction on retention outcomes, reinforcing their moderating role within the retention framework.

Table 7. Descriptive Statistics for Intention to Stay

Item Code	Item Statement	Mean	SD
ITS1	I intend to stay in this school next year	3.89	0.85
ITS2	I would like to continue working in this school	3.94	0.82

Interpretation:

The results demonstrate a general positive intention among the teaching staff to stay with the current institution, but the amount of variation evident suggests that turnover risk still exists among the teaching staff.

4.3 Measurement Model Results (Confirmatory Factor Analysis)

Confirmatory Factor Analysis (CFA) was employed to evaluate the measurement model, with specific emphasis on establishing construct reliability and convergent validity.

Table 8. CFA Results: Reliability and Convergent Validity

Construct	Items	Factor Loading Range	CR	AVE
Professional Development	PD1–PD3	0.72–0.81	0.86	0.55
Sustainability Practices	SP1–SP3	0.72–0.84	0.83	0.52
Working Conditions	WC1–WC3	0.71–0.82	0.85	0.58
Job Satisfaction	JS1–JS4	0.76–0.87	0.88	0.60
Intention to Stay	ITS1–ITS2	0.78–0.80	0.82	0.54

Interpretation:

All constructs exhibited strong and statistically meaningful factor loadings, with composite reliability values exceeding the recommended threshold of 0.70 and average variance extracted (AVE) values above 0.50. Collectively, these indicators provide clear evidence of satisfactory internal consistency and convergent validity within the measurement model.

4.4 Structural Model Results

Structural Equation Modelling (SEM) was used to test the hypothesised relationships among the study variables.

Table 9. Structural Equation Model Results

Structural Path	β	p-value	Hypothesis Status
Professional Development → Job Satisfaction	0.34	< .001	Supported
Sustainability Practices → Job Satisfaction	0.28	< .01	Supported
Working Conditions → Job Satisfaction	0.33	< .001	Supported

Job Satisfaction → Intention to Stay	0.46	< .001	Supported

Interpretation:

The structural model shows that professional development, sustainability practices, and working conditions significantly positively predict teachers' job satisfaction. Professional development exerts the strongest influence, $\beta = 0.34$, $p < .001$, 95% CI [0.26, 0.42], followed by working conditions, $\beta = 0.33$, $p < .001$, 95% CI [0.24, 0.41]; the effect of sustainability practices is $\beta = 0.28$, $p < .01$, 95% CI [0.19, 0.37]. Job satisfaction now becomes the strongest predictor of intention to stay: $\beta = 0.46$, $p < .001$, 95% CI [0.38, 0.54], reiterating its cardinal mediating role in the retention framework.

4.5 Mediation and Moderation Analysis

Table 10. Mediation and Moderation Effects

Relationship	Effect Type	Effect Value	Result
Sustainability Practices → Job Satisfaction → Intention to Stay	Indirect	0.13	Partial mediation
Professional Development → Job Satisfaction → Intention to Stay	Indirect	0.15	Mediation supported
Job Satisfaction × Motivation → Intention to Stay	Moderation	0.24	Moderation supported

Interpretation:

The analysis shows that job satisfaction serves as a partial mediator in the relationships linking sustainability practices and professional development to teachers' intention to stay. In addition, motivation plays a significant moderating role by strengthening the association between job satisfaction and retention intentions, indicating that satisfied teachers with higher intrinsic motivation are more likely to remain in their institutions.

4.6 Predictive Analytics Results

Table 11. Predictive Model Performance

Model	Accuracy (%)
Logistic Regression	63
Random Forest (SFTR-AI)	85

Interpretation:

The AI-based Random Forest model substantially outperformed the traditional regression approach, demonstrating the effectiveness of the SFTR-AI framework for early identification of retention risk.

5. DISCUSSION AND RECOMMENDATIONS

The purpose of this study has been to develop and test the validity of an AI-based Sustainability Framework of Teacher Retention (SFTR-AI) in a private school setting. On one hand, it has been found that there is significant proof for the conceptual framework, while on the other hand, it has offered significant theoretical as well as pragmatic views of how sustainability & organisational practices of schooling influence teacher retention intent. This study has transcended simple views of teachers' retention by merging principles of sustainability with sophisticated data analytics.

One of the most striking results is the pivotal position of job satisfaction, which emerged as the strongest predictor of teachers' intention to remain in their institutions. The structural model reveals that job satisfaction not only has a direct effect on retention intentions but also serves as an important mediating mechanism through which institutional factors exert their effects. Whereas this finding is consistent with longer-standing retention research, the current investigation contributes to existing knowledge by demonstrating that job satisfaction does not simply represent a reaction to short-term conditions of work. Rather, it expresses teachers' reactions to broader, longer-term institutional practices, thus reinforcing the view that satisfaction is derived from perceptions of organisational steadiness, support, and future direction.

This model showed that professional development significantly and positively influenced job satisfaction. Teachers whose perceptions involved access to training regularly, workshops with meaning, and clear career development pathways were satisfied more. Such a finding indicates that professional development is a palpable manifestation of institutional investment and recognition. In private school environments, where job security may be less guaranteed, such investments would appear to foster psychological confidence and professional commitment, which in turn dampen turnover intentions. These findings stress the need for visible and continuous development opportunities as a core retention strategy.

A distinctive contribution of this study lies in the empirical illustration it provides regarding how school sustainability practices contribute to shaping the retention outcomes. Practices like long-term planning, consistent resource allocation, and explicit attention to teacher well-being were found to influence job satisfaction and consequently intention to stay. The mediation results suggest that practices for sustainability do not operate in a vacuum; instead, they ensure retention by means of institutional trust and reinforcing teachers' perception of long-term security. That means the teachers assess not only their current working conditions but also the perceived ethical orientation, stability, and future viability of the institution when deciding whether to stay.

Working conditions also featured as a driver of job satisfaction, though still with a focus on workloads, leadership, and the organisational climate. Yet the greater dispersion of the data for questions concerned with working conditions implies considerable variation in the experience of teaching staff within private schools. This could help to explain the interactive finding concerning the stronger impact of working conditions on job satisfaction rather than directly on intentions to remain. This is to say that a positive experience produces the former, but the latter is essentially mediated by the degree of job satisfaction.

One of the most significant behavioural findings in the study is about the moderating effect of motivation. Findings from the study have shown that motivation improves the relationship between job satisfaction and intent to stay. Teachers who are highly motivated are more responsive to supportive organisational conditions. When these teachers are satisfied, they are more likely to stay. This has shown that measures aimed at retaining teachers are more effective when these measures are combined with efforts that promote intrinsic motivation.

Apart from its role in explanatory modeling, the AI-based predictive part of the research offers a considerable operational advantage. The Random Forest model showed significantly higher prediction accuracy

compared with traditional regression models and underlined the viability of proactive retention risk prediction based on a set of institution-related and psychological variables. This changes the character of retention management from a reactive procedure to an anticipation-based and evidence-led one.

Limitations of the Study

A number of limitations need to be taken into consideration when it comes to the findings of the current research. Firstly, it needs to be pointed out the current research utilizes a cross-sectional survey task, gathering information from a total of 300 teachers in the context of private schools. Although the task chosen in the current study suits the investigation of the relationship that may exist among the various variables, it does not suit the validation of a cause-and-effect relationship, limiting the generalizability of findings in a different setting.

Second, while it is noted that a high level of classification accuracy of 85 per cent was attained in the AI-driven predictive model, it is also pertinent to note that an error rate of about 15 per cent nonetheless lingers. This implies that while retention outcomes are not entirely measured through the employed variables in some capacity, there also exists scope for some level of biased response in self-reported variables. Taking these two into consideration, it might be appropriate to conclude that while results are to be treated with a certain degree of care, these would not be entirely incorrect from a broader institutional context.

Future Research Directions

Even with the above research providing a solid basis for comprehension related to the issue of teaching retention in private schools, future research could be improved through the consideration of long-format study models. These models would enable the researcher to monitor the involved teachers over time and assess the impact that the development and leadership processes have on the issue of teaching satisfaction and, by extension, teaching retention.

Further studies could also include extending the SFTR-AI model into different educational environments, like public schools, rural schools, low-fees private educational settings, and even abroad. This will allow comparisons among different educational setups that will show the effects created by different cultures, factors, and policies surrounding retention. Another area for further studies could be developing the model into different professions, like medical and social services.

Finally, another important area of development pertains to improving the AI portion of the framework itself via the inclusion of institutional data. It is possible that modeling self-perceived data in addition to other variables, including workloads, attendance, employee turnover, and participation in professional development programs, may enhance outcomes. Future studies might also fully test several of the AI-based support mechanisms in a typical educational setting, providing important information regarding their utility.

6. CONCLUSION

The purpose of the above study was the development and empirical testing of the Sustainability Framework for Teacher Retention (SFTR) because the analysis aimed to explore how Professional Development, Sustainability Practices, Work Conditions, Job Satisfaction, and Motivation interplay and impact the relationships between teachers and private schools through the lens of the SFTR framework through the lens of CFA and SEM, and the results show that indeed the constructs interplay in a meaningful and theoretically consistent manner, and among these, Job Satisfaction is the key mechanism through which the processes initiated by Professional Development and Sustainability Practices lead to long-run commitment and loyalty because surely, supportive environments that can preserve their professionals' value and future are important.

The core strength of this study is its focus on school sustainability practices that have remained understudied in previous retention

studies. Findings show that private school teachers respond toinstitutional cues that convey a sense of longevity or stability. In addition to this, it has been observed that school sustainability practices have a reinforcing effect on personal factors that shape school retention. It has also been observed that intrinsic motivational levels influence school retention. In other words, it has been found that individuals who are highly motivated tend to be more concerned about not losing their sense of commitment to school.

The validated framework from SFTR enables school administrators to reap both conceptual and practical benefits. It enables them to have a focused perspective where the assessment of all related variables for teacher retention is systematically performed. SFTR-AI enables administrators to systematically examine the experiences of educators on a periodic basis. Through predictive modeling, the implication of using SFTR-AI may result in the improved retention of educators in private education institutions by 12-18%.

DECLARATIONS

Availability of Data and Material

The data supporting the findings of this study were collected through a structured questionnaire administered to teachers working in private K–12 schools. Due to ethical considerations, institutional confidentiality agreements, and participant anonymity commitments, the raw datasets are not publicly available. However, anonymized and aggregated data may be made available from the corresponding author upon reasonable request for academic and research purposes.

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Authors' Contributions

Jency Cherian conceptualized the study, designed the research framework, conducted data collection, performed data analysis, and drafted the manuscript. Sandeep Kumar Shivhare contributed to research supervision, methodological guidance, interpretation of results, and critical revision of the manuscript. Both authors read and approved the final manuscript.

Ethical Consideration

The study was conducted in accordance with established ethical guidelines for research involving human participants. Prior approval was obtained from the institutional ethics committee. Participation was voluntary, informed consent was secured from all respondents, and anonymity and confidentiality of participant information were strictly maintained throughout the research process.

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