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Contents

Work-from-home Factors Impacting Workers' Productivity and Well-being: A Mediation Analysis

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Abstract: The paper emphasises the effect of factors related to work from home and how they impact the productivity and well-being of the employer. Further, a mediation analysis has been carried out to find out how the experience factor of the worker mediates the relationship between the factor associated with work from home and the productivity and well-being of the workers. A multi-stage stratified sampling method is used to generate a reliable and statistically valid sample comprising 360 employees from various fields in the Trivandrum, Kochi, and Calicut districts. The chi-square analysis found that there is no noteworthy relation between the demographic factors and the productivity of the workers. The MANOVA result indicates that home-related factors in different sectors lead to differences in work practices. SEM model reveals that the factor "work-life balance (WB)" has the highest optimistic impact on worker efficiency, followed by the factors social connection and communication and collaboration. Experience acts as a significant intermediary in the association between home factors and efficiency. Both direct and indirect effects are statistically important, with the indirect effect showing that experience enhances productivity in a work-from-home setting. This suggests that employees with more experience adapt better to work-from-home conditions, becoming more productive.

1. Introduction

The epidemic has led to an important and widespread movement towards work-from-home policies. This is an opportunity to gain insight into how work from home factors influence workers' performance at work as well as their personal lives and health. Numerous countries around the globe were forced to implement lockdown restrictions to diminish the blowout of the COVID-19 pandemic. One of the strategies used during the lockdown was remote working. It was implemented by all businesses, both developed and emerging, in a variety of industries to safeguard their workers and continue operations in order to minimise potential losses (Kurdy et al., 2023).

Work from home (WFH) is a job planning that permits workforces to do their work responsibilities from home or another distant location. In place of commuting to a traditional place of work like an office, warehouse, or retail store, they stay connected with colleagues and perform their duties through tools such as phone calls, emails, and virtual meetings - commonly referred to as remote work (RW) or telework (TW). People all throughout the world have been shocked by the announcement of a unique virus called COVID-19, also denoted as the coronavirus (Anakpo, 2023). Work from home has benefits, but there are plenty of disadvantages to working work from home. Employees who work from household slip out on openings to cooperate with colleagues and might move less bodily, like rambling to and from conferences (Tavares, 2019).

The rapid changes to work from home and other COVID-19 connected features offer an exceptional setting for examining the influence of work from home on both physical and mental health. Social and behavioural variables account for the majority of perceived health effects. Specifically, the lengthy stay-at-home orders issued during the pandemic could be a factor in the overall emotions of depression and anxiety, which frequently result in dietary and repetitive alterations (Di Renzo et al., 2020). These nutritional and movement modifications may combine with other work from home -

connected stressors, which together may have a harmful result on one's bodily and psychological health (Schnitzer et al., 2020). Furthermore, workers with children are probably even more affected by these behaviours because of the closure of day-care centres and schools, which forces working parents to home-school their kids besides balancing a more disordered workroom with more interruptions (Arntz et al. 2020).

Raisiene et al. (2020) argued that since the literature's knowledge of telework was developed prior to the pandemic and because people who were introduced to work from home practices as a consequence of the epidemic had unique experiences, a scholarly foundation on work from home practices brought on by the pandemic is crucial for addressing issues with human resource management. The lack of prior investigation on the perceptions of work from home arrangements among construction workers as an outcome of epidemic lockdowns led to the conduct of the current investigation. Thus far, the majority of studies on the pandemic's effects have emphasized building site operations, particularly with regard to the fitness and security of on-site labourers, as demonstrated by the logical evaluation of articles (Raišienė et al., 2020). Organizations did not have enough time to prepare or take action with measures intended to ease the transition for employees since the epidemic and the switch to work from home came as a sudden shock (George et al., 2022). The aspects that affect productivity and well-being that might not be apparent in relation to less drastic changes in the environment are exposed by this unfiltered unfolding of events. Managers can help and retain employees during a forced transition to work from home more successfully if they are aware of the effects on workers and the factors that has a role in this process. Hence, the present research is to examine how the components of work from home affect the output and well-being of the worker and how experience as a mediating factor affects the association among the above two.

A noteworthy research gap exists in understanding how elements such as gender, age, and educational qualifications moderate the association among work from home live out, employee efficiency, and happiness. While existing researches have acknowledged the role of prior work experience, there remains a lack of comprehensive mediation analyses exploring how varying levels of experience shape the outcomes of remote work in terms of job satisfaction and performance. Addressing these gaps is essential to provide deeper insights into the diverse ways employees are affected by work from home arrangements and to design tailored organizational policies that foster both productivity and well-being across different workforce segments.

Global events have expedited the use of remote work, which has raised interest in learning more about how it affects workers' well-being and productivity at work. A substantial study vacuum exists about how certain demographic characteristics-gender, age, and educational attainment—moderate these linkages, even though a growing corpus of literature examines these dynamics. Furthermore, even though some research recognizes that experience influences results, more thorough mediation analyses are required to comprehend how different experience levels affect how distant work affects output and job satisfaction. Moreover, the majority of current research on remote work concentrates on average results from a variety of employee demographics. Although this method offers insightful information on broad patterns, it ignores the complex ways that demographic variables may affect these results. Gender differences have been noted, for example, in work-from-home experiences and outcomes; research indicates that women may have distinct possibilities and obstacles than males. The age factor is particularly important since older workers may not be as comfortable or adaptive to remote work technology, which might have a distinct effect on their output and job satisfaction. The situation is further complicated by the fact that people with higher levels of education may behave and produce differently from others when working remotely, depending on their educational background. It is essential to comprehend how these demographic factors alter the link between productivity and job well-being when working remotely to build tailored tactics that meet the demands of a varied workforce. Although the influence of population elements on the results of remote work is becoming better acknowledged, the mediating effect of experience is still not fully understood. In this sense, experience includes both length of service with the company and more general professional experience as well as knowledge of remote work procedures. Studies that already exist frequently assume a linear link between remote work and outcomes, failing to take into account the potential effect of dissimilar experience levels on this relationship. Employees with varying levels of expertise

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may utilise remote work possibilities in different ways. This might potentially mitigate the effects on job satisfaction and productivity by allowing for greater task autonomy, flexibility, and self-management. On the other hand, less seasoned workers could have more difficulties when working remotely, which could affect their capacity to remain productive and fulfil their jobs.

Based on the above gap, the following research questions are developed: What direct implications does remote work have on workers' well-being and productivity at work? What role does work experience play in mediating the link between productivity and job well-being in remote employment? What are the processes that experience uses to affect these results? In what ways do age, gender, and level of education mitigate the impact of WFH on job gratification and efficiency? What are the demographic differences in the impacts of working remotely?

2. Review of Literature

Before the epidemic, work from home, also recognized as flexible working, remote work, or telework-was widely discussed in academic literature. Numerous systematic review studies have explored work from home from different perspectives, reflecting the growing interest and research in this area. These studies cover the merits and demerits of work from home (Allen et al., 2015), the connections among supple work measures and managerial and individual performance results (De Menezes and Kelliher, 2011), and the psychological implications of telework on individuals (Gajendran and Harrison, 2007). However, as the research has shown, the incidence of remote working was quite low. The earlier studies, however, reveals that the occurrence of remote working was comparatively little. For instance, Felstead and Reuschke (2021) initiate that the change to work from home (WFH) had occurred gradually in the UK, with a 3% upsurge over nearly 40 years between 1981 and 2019, peaking at 4.7% in 2019, just earlier the epidemic. Comparably, 5.4% of employed people in the European Union between the ages of 15 and 64 said that they typically worked from home in 2019. This tendency has persisted over the past 10 years.

However, Mokhtarian et al. (2005) contended that the literature's estimates of the prevalence of telecommuting varies significantly because of the various telecommuting arrangements (part-time vs. full-time), as well as the variations in study samples and sampling methodologies. However, prior research conducted before the pandemic, mostly concentrating on voluntary and/or informal work from home mode, offers hopeful indication on its advantages on both a individual and organizational level (Allen, 2015). According to a survey done in Australia about six months into the epidemic, Oo and Lim (2021) discovered that mandatory work-from-home arrangements, shifts in work place and hours, and an increase in family responsibilities are just a few of the novel circumstances and difficulties challenged by womanly workers in the Australian building manufacturing. Overworked; (ii) workspace; (iii) social interactions; (iv) teamwork; and (v) childrearing were the top issues rated about the changes in work location and hours (Oo and Lim, 2021). The experiences of women employed in the construction sector with remote work have been determined to be unique due to two factors: (i) the sudden changeover to remote work brought on by the epidemic; and (ii) the relatively low rate of steady and scheduled remote work (or WFH) in the sector before the epidemic (Oo and Lim, 2021). In fact, one of the sectors with the highest levels of gender segregation and male dominance is construction (Ness, 2021).

In Farooq and Sultana's (2022) research on the COVID-19 epidemic in India, they looked at worker productivity and work from home among 250 people. They also looked into how gender affected the association among work from home and workplace efficiency. Their results support the adverse relationship between worker productivity and work-family health. The investigation indicates that gender has a part in moderating the association among worker production and work from home. Hafsah (2022) inspected the practices of millennial workers in Indonesia during the COVID-19 epidemic using 367 responses, finding that working from home had a good outcome on engagement, morale, and output. Using technologies to mitigate this effect, Narayanamurthy and Tortoella (2021) inspected the influence of COVID-19 on work efficiency using a sample of 106 personnel. Employee performance and output quality were improved by working from home. To determine if worker participation in work-from-home engagements was related to total occupation efficiency, productivity

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from distant work, and its effects on the efficiency of employees who had kids below the age of 18, Toscano and Zappalà (2021) analyzed 171 participants in Italy. They came to the conclusion that working from home boosts a person's perception of efficiency, which raises his or her real efficiency.

Prasetyaningtyas et al. (2021) examined the impact of work-family harmony (WFH) on output within the banking sector, utilizing data from 234 participants in Indonesia. They examined how work-life balance and job efficiency, as well as WFH's direct impact on productivity, are mediated by work from home. The authors discovered that, through job satisfaction, work-family harmony had a favourable impact on total productivity. The outcomes, however, also established that work from home had a harmful influence on WLB. Marnisah et al.'s (2022) study examined the effect of work from home on 105 Kupang employees' job gratification, organizational commitment, and institutional culture. The outcomes of the research by Mannisah et al. (2022) showed that, either partially or concurrently, work from home, organizational commitment, and organizational culture all had a positive and substantial impact on employee performance. When it comes to employee performance, the work atmosphere, technological infrastructure, and intrinsic motivation all play a role when it comes to working from home. At the same time, there was no discernible connection found among employee efficiency and work independence. Unlike at the workplace, workers have more liberty to do their tasks on their own creative time. Nonetheless, there are definite complications with the setting of working from home. Absence of Internet and other technology resources hinders some workers in their home offices from performing their tasks effectively (Sridhar and Bhattacharya, 2020). The introduction of a work digitalization system is one of the steps the government must take to solve the problem of insufficient work equipment for employees. Leaders could also consider increasing the ability to use technology by providing IT training.

Jaiswal and Arun (2022), there was a decrease in production and an increase in workers' stress levels. Employees who are talented to work from home save cash on traveling costs, that may reduce anxiety and enhance efficiency at work, according to study by Putri and Aman (2021). Furthermore, work-from-home circumstances may also have a large effect on how dynamic workers are. Since some works cannot be finished from home, working from home is not something that is regularly accepted (Mustajab et al., 2020). For example, certain jobs call for huge equipment, which can be perplexing to erect in a house since it needs a substantial places to be set up and used. In a like manner, certain onsite works that is, those where workers must go to their clients' places or locations—cannot be completed from home. The workers' efficiency can suffer as a result of this. The outcomes of Mustajab et al. (2020), who concluded that work from home is the reason for the drop in employee productivity and that it benefits some workers but harms others. Although many workers reported having an improved work-life balance, the authors showed that work from home cannot be broadly accepted since some forms of labour cannot be done in the cosiness of one's own home (Alifuddin and Ibrahim, 2021).

Pirzadeh and Lingard (2021) looked at how distant work affected the mental health of construction workers who were employed both on-site and in work from home. Their findings indicate that, in terms of mental health, physical activity, sleep, nutrition, and work-life happiness, there is no noteworthy variance among the two clusters of respondents. Work-life satisfaction moderated the significant negative effects of augmented hours of working, feeling pressed for time, and work interfering with social life on respondents' mental well-being, even though some respondents expressed a preference for work from home, according to their regression analyses. According to Etheridge et al. (2020), workers who telecommute claim to be just as productive as those who work in an office, and those who feel their productivity is declining report lower levels of well-being from their work-from-home experience. Employees at Barrero et al. (2021) claim aids such as smaller travels, more dynamic work timetables, and extra efficiency; nevertheless, Bellmann and Hübler (2020) discover that working remotely only temporarily improves job happiness and has no lasting influence on work-life balance.

Workers also say that around 35% of the time that was saved was utilized to improve use at work. The rise in work from home work hours that we find in our data is not predicted by variations in projected travel times. Businesses are permitting worker to work from home more frequently for a diversity of causes, such as less office rent, improved work-life balance, condensed travel time, and abridged

threat of the poisonous virus dispersal. The author also notes that as more nations adopted physical segregation as a means of halting the virus's transmission, working from home became more and more common throughout the COVID-19 pandemic's quarantine period. Consequently, for some employees, working from home is their only option. Nonetheless, even though all employees lost output, Fenizia and Kirchmaier (2023) found that workers who had kids living at home lost more exceptional productivity than those who did not. Furthermore, work from home was more harmful to females than to males. Rather, it could have come about as a result of the various household responsibilities women have when working from home. Thus, the present investigation targets to examine the elements related to Work from home has affected the capacity and well- being of the workers. The major objectives are to:

- To analyse the influence of the demographics of workers on their efficiency and well-being
- To analyse the sector-wise comparison of work-from-home related factors of employees.
- To undertake a sector-wise comparison of work productivity and well-being of workers.
- To examine the outcome of work-from-home-related elements on workers' efficiency and well-being.
- To analyse the mediating role of experience in the association between workers' productivity and work-from-home-related factors.

Given the way that current work environments are changing, the investigation on the effects of WFH on employees' productivity and job well-being—which takes experience into account and modifies it by gender, age, and educational background—is quite relevant. Firstly, companies are becoming more and more interested in learning how work-from-home arrangements affect output and job satisfaction, as a result of the rapid adoption of remote work brought about by world events. Through a methodical analysis of these variables, the research can yield empirical data about the impacts of distant work on total job satisfaction, comprising work-life balance and stress levels, as well as whether or not it increases or decreases productivity. These kinds of insights are essential for companies trying to maximize their rules on remote work to generate a positive and fruitful work atmosphere.

Second, the mediation analysis that canters on the mediator's expertise will clarify how the tenure and professional backgrounds of workers affect the association between remote work and job well-being and productivity. This knowledge may be used to develop ways to support workers at various phases of their careers, increasing their productivity and job gratification in distant work situations.

Thirdly, the moderation analysis that takes age, gender, and educational background into account will show how a variety of demographic factors influence the effects of working remotely. Organizations may better fulfil the requirements of various employee groups by customizing their policies and support systems and by identifying and correcting possible discrepancies. Initiatives to advance gender equality and inclusion in remote work contexts, for example, might benefit from understanding how gender affects distant work results. Overall, it is anticipated that the study's conclusions will progress theory and practice. In practical terms, they may guide evidence-based decision-making when creating rules for remote work that optimize output while fostering employee well-being across a range of demographic groups. The study has the potential to enhance our comprehension of the complicated association between remote work arrangements, individual traits, and organizational results. It will also add to the conversation about modern work practices and how they interrupt employee engagement and organizational success in the digital era.

3. Research Methodology

3.1. Data and methodology

The present study was conducted in the state of Kerala, India, and adopted a descriptive research design. The study combined correlational, cross-sectional, qualitative, and non-experimental approaches to explore the research problem in depth. This design was considered appropriate, as the primary objective was to examine the existing patterns of relationships among variables without manipulating any of them.

3.2. Population and Sample Design

The population under investigation consisted of employees working across diverse fields and sectors within Kerala. Given the broad scope of the study, a multi-stage random sampling technique was employed to ensure adequate representation.

• First Stage (Zonal Division): Kerala was divided into three major zones based on its geographical distribution: North, Central, and South.

• Second Stage (District Selection): From each zone, one district was selected at random. To ensure a stronger representation of employees, especially from the IT sector, districts with a comparatively higher concentration of IT professionals were purposively retained. Accordingly, Calicut (North), Kochi (Central), and Trivandrum (South) were chosen.

• Third Stage (Respondent Selection): Within these districts, respondents were identified from different organizations and professional backgrounds using random sampling techniques.

3.3. Sample Size

A total of 360 respondents participated in the study, with contributions distributed across the three districts. This sample size was considered sufficient to provide reliable insights, while ensuring feasibility in terms of data collection and analysis.

3.4. Research Tool

A systematic questionnaire was developed to identify which components of online job are impacting the productivity and well-being of workers. Thirty respondents finished the questionnaire's pre-test before the survey's actual administration. By ensuring that both the participants and the investigators understood the question, pre-testing findings, comments, and recommendations helped to refine and finish the questionnaire, hence reducing the chance of measurement errors. The completed questionnaire is divided into 1. The primary focus of the questionnaire's first section was the respondents' socioeconomic information. 35 declarations pertaining to "Work-Life Balance (WB)", "Communication and Collaboration (CC)", "Autonomy and Control (AC)", "Support and Resources (SR)", "Social Connection (SC)" as well as "Productivity and well-being (PW)" have been included.

4. Results and Discussion

Microsoft Excel was used to enter quantitative data, and SPSS 23 was then used to clean, organize, code, and analyze (George and Mallery, 2016). A descriptive analysis was done to explain the respondent's demographic characteristics. A chi-square test was used to test the influence of demographic features on worker's productivity. MANOVA was employed to compare the aspects of the online work environment that affect employees' productivity on a sector-by-sector basis. Additionally, a one-way ANOVA was used to compare worker productivity by sector. Furthermore, SEM was created to examine the impacts and influences of five elements on the workers' productivity and well-being. Additionally, a mediation study was conducted to examine the role that experience had as a mediating factor in the association among the online work environment parameters and the productivity and well-being of the workers. To analyze mediation processes, at least three variables are required: X, M, and Y. Here, X represents the explanatory variable (EV), Y is the dependent variable (DV), and M is the proposed mediator that helps convey the impact of X on Y. Mediation involves understanding how an intermediate variable (M) transmits the causal association from the independent variable (X) to the dependent variable (Y). The total effect (TE) of X on Y comprises both the direct effect (DE) — the influence of X on Y without mediation — and the indirect effect (IE), which occurs through the mediator M. In essence, the relationship between X and Y can be divided into a direct pathway and an indirect one (Agler and De Boeck, 2017).

To decide whether the sample collected was adequate, the "Kaiser-Meyer-Olkin (KMO)" and "Barlett's Test of Sphericity (BTS)" were employed. This is presented in Table 01.

Table 1: KMO and Bartlett's Test

KMO Measure		0.846
BTS	Approx. Chi-Square	4369.128
	Df	354
	Sig.	0.000

Source: Primary data

Findings of the test of normality is displayed in the below table 02 and have a normality of 0.27 (p = 0.263, statistically insignificant). The Shapiro-Wilk test result is 0.941 as a result. It represents a set of data that is normally distributed.

Table 2: Test of Normality

	Kolmogorov-Smirnova [a]			Shapiro-Wilk		
Quartile	Statistic	df	Sig.	Statistic	df	Sig.
	0.272	242	0.263*	0.941	242	0.341

Note: * denotes lower bound of the true significance, and [a] denotes Lilliefors significance correction.
Source: Author's compilation.

A reliability analysis was conducted on the responses about the elements connected with online working and their effect on workers' productivity and well-being using 35 statements that were recorded on a five-point scale. An attempt was made to assess dependability using the traditional Cronbach Alpha (CA) model. The final alpha value for each component is shown in Table 3 below, which is dependent on the number of statements that are currently being studied.

Table 3: Reliability Statistics

	CA	CA Based on Standardised Items	Statement
Work-Life Balance (WB)	0.889	0.891	5
Communication and Collaboration (CC)	0.823	0.834	5
Autonomy and Control (AC)	0.861	0.865	5
Support and Resources (SR)	0.843	0.858	5
Social Connection (SC)	0.857	0.861	5
Worker's Productivity and Well-being	0.872	0.878	5

Source: Primary data

4.1. Effect of Demographics of Workers on their productivity and well-being

The results of chi-square tests are shown in Table 04, which shows that there is no noteworthy association among the sample of demographics of workers on their work efficiency and well-being. These factors include age, educational attainment, and experience. The p-values were all more than 0.05.

Table 4: Demographic Effect on Workers' Productivity and Well-being

Variables	Chi-square	p-value
Age	59.214	0.236
Educational Qualification	74.562	0.487
Experience	89.147	0.639

Source: Survey data

4.2. Sector-wise Work from home related factors of Employees

The MANOVA test was employed to analyse the variances in work-from-home related factors (WH) measures of workers engaged in different sectors, such as public and private. Tables 05, 06, and 07 display the results of the analysis

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Table 5: MANOVA (WH)

	Effect	Value	F-value	P-value
Intercept	Pillai's Trace	.978	10374.546	*.000**
	Wilks' Lambda	.006	10374.546	*.000**
	Hotelling's Trace	112.696	10374.546	*.030**
	Roy's Largest Root	112.696	10374.546	*.000**
Agricultural categories	Pillai's Trace	.063	2.561	*.023**
	Wilks' Lambda	.946	2.448[b]	*.017**
	Hotelling's Trace	.063	2.448	*.017**
	Roy's Largest Root	.042	3.748[c]	*.005**

Note: * denotes significant.
Source: Survey data.

Table 6: Tests of Between-Subjects Effects- (WH)

Source	Endogenous Variable	F	P-value
Categories	Work-Life Balance (WB)	6.125	*.002**
	Communication and Collaboration (CC)	3.236	*.031**
	Autonomy and Control (AC)	4.569	*.003**
	Support and Resources (SR)	4.614	*.015**
	Social Connection (SC)	4.125	*.018**

Note:*Significant at 5 percent level.
Source: Survey data.

Table 7: Average values of WH variables

SE Variables	Sectors	Mean	Std. Error
Work-Life Balance (WB)	Private Sector	48.145	.296
	Public Sector	51.569	.741
Communication and Collaboration (CC)	Private Sector	54.569	.378
	Public Sector	58.289	.895
Autonomy and Control (AC)	Private Sector	30.369	.189
	Public Sector	34.556	.639
Support and Resources (SR)	Private Sector	33.251	.369
	Public Sector	31.254	.457
Social Connection (SI)	Private Sector	68.145	.144
	Public Sector	65.361	.896

Source: Survey data.

The overall average scores of employers on the five work-from-home-related factors showed a significant variation among the two categories, as indicated in Tables 05, 06, and 07. The MANOVA test using Pillai's Trace was found to be significant at the 5% level (p = 0.01), indicating meaningful variation. When each of the five sector-specific variables was analyzed separately, the test of Between-Subjects Effects revealed statistically significant differences across all variables (p = 0.002, 0.031, 0.003, 0.015, and 0.018). The Estimated Marginal Means further indicate that public sector employees report higher scores in "Work-Life Balance (WB)," "Communication and Collaboration (CC)," and "Autonomy and Control (AC)," while private sector employees show higher scores in "Support and Resources (SR)" and "Social Connection (SI)."

4.3. Sector-wise comparison of work productivity and well-being of workers

 One Way ANOVA was employed to measure the variation in the "work productivity and well-being" of employees in the private and public segments in the state, and the results are shown in Tables 08 and 09.

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Table 8: Estimated Marginal Means of Decision-Making Skill: Sector-wise

Sectors (Independent variable)	Mean	Std. deviation
Private	42.693	3.15891
Public	44.569	2.78965
Total	43.631	2.97428

Source: Survey data.

Table 9: One-Way ANOVA (Tests of Between-Subjects Effects with Decision-Making Skill as Dependent Variable)

Source	Sum of Squares	df	Mean Square	F	Sig.
Between sectors	273.147	3	137.845	14.568	.000
Within sectors	3411.2697	356	7.569		
Total	3568.857	359			

Source: Survey data.

The productivity and well-being of workers in private and public sector varies significantly depending on the category sector they have involved, as shown in Tables 07 and 08 above. The average productivity and well-being of workers in private and public sector are 42.693, and 44.569 respectively. At a 5 per cent level, the mean difference is statistically important (F value 14.568). Thus, it is concluded that between the two categories, workers employed in the private sector have the highest level of productivity and well-being when they are working from home.

4.4. Effect of work-from-home related factors on productivity and well-being

4.4.1. Calculating model, reliability, and validity

Prior to SEM, confirmatory factor analysis (CFA) was conducted. The number of elements and their association to the pointers are exactly defined by the CFA approach, which analyses measurement models that are built a priori. CFA (fig. 1) is used to assess the model's fit to the data. The CFA results are displayed in the table below. Table 10 shows that utilizing a higher number of samples (sample size = 360) resulted in a computed value of 0.1000, which is less than the value of 0.05. Conversely, the model's well-fitting is indicated by the CMIN/DF ratio of 2.484, which resolves the previously mentioned problem. In this case, the CFI value is 0.956. Additionally, the findings indicate that the root mean square residuals (RMR) and root mean square error of approximation (RMSEA) are 0.0374 and 0.0412, respectively, below the generally accepted 0.08 proposed by Hair et al. (2006).
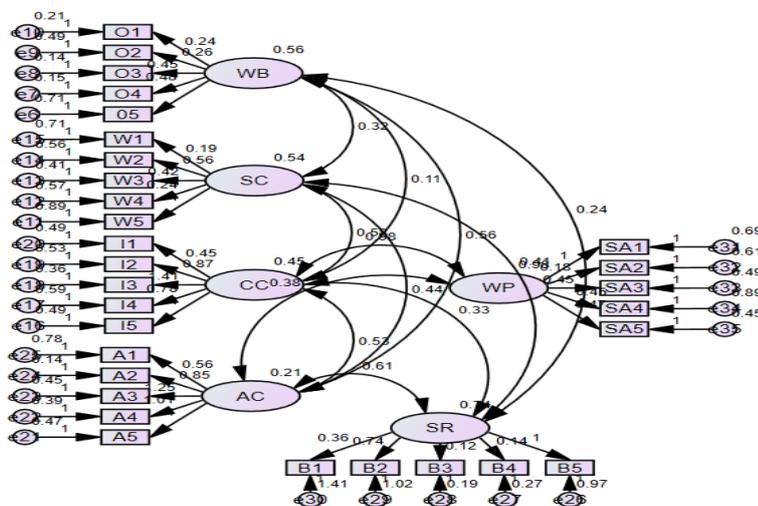
Figure 1: Confirmatory Factor Analysis

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Table 10: CFA Results

Indices	Model fit Result	Suggested value
CMIN/DF	2.484	< 5.00
P value	0	> 0.05
GFI	0.915	> 0.90
AGFI	0.989	> 0.90
NFI	0.92	> 0.90
CFI	0.956	> 0.90
TLI	0.967	> 0.90
RMR	0.0374	< 0.08
RMSEA	0.0412	< 0.08
PNFI	0.712	> 0.50
PCFI	0.696	> 0.50

Note: The suggested values are based on Hair et al., 1998; Hu and Bentler, 1999.
Source: Author's compilation.

Hair et al. (2006) state that even when the model satisfies the model of measurement fit criteria, it is essential to consider the construct validity and dependability of the model before moving on to the structural model. According to Hair et al. (2010), the measuring framework for latent ideas must satisfy the three categories of validity: discriminant validity, convergent validity, and construct validity. The measurement model's fitness indexes are used to estimate construct validity, the average variance extracted (AVE) is employed to investigate convergent validity, and a summary of the discriminant validity index is generated to evaluate discriminant validity Using IBM SPSS AMOS, we evaluated and computed the correlation coefficients between components. The findings reveal that none of the components exhibit a correlation exceeding 0.85 with any other component. Therefore, it can be inferred that the measurement model in this study has established discriminant validity.

4.4.2. SEM analysis

A SEM analysis using AMOS was done to inspect the impact of factors such as Work-Life Balance (WB), Communication and Collaboration (CC), Autonomy and Control (AC), Support and Resources (SR), and Social Connection (SC) on employee well-being and productivity. With a sample size of 360, the computed p-value was 0.028, which is under the limit of 0.05, indicating statistical significance. The CMIN/DF ratio was 3.696, suggesting an model fit, while the chi-square value of 29.614 (df = 20) further confirmed that the model fits the data significantly. Model fit indices also demonstrated strong validity, with the Tucker-Lewis Index (TLI = 0.972), Adjusted Goodness of Fit Index (AGFI = 0.936), and Goodness of Fit Index (GFI = 0.978) all exceeding the recommended threshold of 0.90. Similarly, the Normal Fit Index (NFI = 0.915) and Comparative Fit Index (CFI = 0.954) indicated an excellent fit. Finally, the Root Mean Square Error of Approximation (RMSEA = 0.0745) and Root Mean Square Residual (RMR = 0.025) were both below the recommended cut off of 0.08, as suggested by Hair et al. (2006), further confirming the robustness of the model.

Table 11: Model Fit Summary of Structural Equation Model

Indices	Value	Suggested value
Chi-square value	29.614	
DF	20	
P value	0.028	> 0.05
Chi-square value/DF	3.696	< 5.00
GFI	0.978	> 0.90

Indices	Value	Suggested value
AGFI	0.936	> 0.90
NFI	0.915	> 0.90
CFI	0.954	> 0.90
RMR	0.025	< 0.08
RMSEA	0.0745	< 0.08
TLI	0.972	> 0.90
PNFI	0.648	> 0.50
PCFI	0.63	> 0.50

Note: the suggested values are based on Hair et al., 1998; Hu and Bentler, 1999.
Source: Author's compilation.

All variables like "Work-Life Balance (WB)", "Communication and Collaboration (CC)", "Autonomy and Control (AC)", "Support and Resources (SR)", "Social Connection (SC)" have a positive impact on the workers' productivity and well-being, as established by Table 12 and from fig. 2, where the unstandardized coefficient of "Work-Life Balance (WB)" is highest with a value of 0.54 when all other route aspects are held perpetual. That is, workers' productivity and well-being is increased by 054.for every unit rise in "Work-Life Balance (WB)".

Furthermore, the unstandardized "Social Connection (SC)" coefficient on employee productivity is 0.47. With productivity rising by 0.47 for every unit rise in "Social Connection (SC)," the positive sign shows that SC has a beneficial impact. At the 1% level, the coefficient value matters. Holding other route elements constant, the coefficients of "Communication and Collaboration (CC)," "Autonomy and Control (AC)," and "Support and Resources (SR)" on women's decision-making ability are 0.39, 0.34, and 0.28 respectively, and show a somewhat positive impact on workers' productivity. The coefficient value is significant at the 1% level of significance.
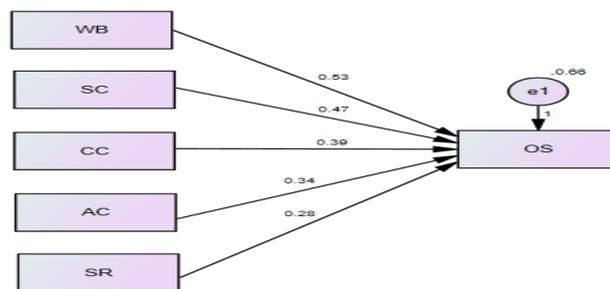
Figure 2: SEM Analysis

Table 12: SEM Result based on Standardised Coefficient

			Estimate	S.E.	t-value	P-value
DM	<---	WB	0.53	0.042	6.451	< 0.001**
DM	<---	SC	0.47	0.061	5.142	< 0.001**
DM	<---	CC	0.39	0.056	6.254	< 0.001**
DM	<---	AC	0.34	0.059	8.987	< 0.001**
DM	<---	SR	0.28	0.044	4.036	< 0.001**

Note: ** denotes significant at a 1% level
Source: Author's compilation.

4.5. Mediation Analysis- Experience

Table 13 presents the summary of the mediation model, indicating that the aspects associated with work from home (WFH) significantly influence employees' capacity to work, with an R² value of 0.66. This suggests that approximately 66% of the variance in workers' productivity can be described by the predictors included in the model.

Table 13: Summary of Model

R	R-square	MSE	F- value	Degree of freedom 1	Degree of freedom 2	p
0.6703	0.6612	0.5664	53.1789	1	168	0

Source: Author's compilation.

As shown in Table 14 and Figure 3, the work-from-home factors (X) exert a significant influence on workers' productivity (Y) and well-being, accounting for 63.62% of the effect. The direct effect of WFH factors on productivity is 53.95%. However, when experience is introduced as a mediator, the analysis reveals that experience significantly mediates the association between WFH factors and productivity. The indirect effect is estimated at 44.7%, with a completely standardized indirect effect of 45%.These results suggest that workers with greater degree of experience are more expected to adapt effectively to remote work settings, thereby enhancing their productivity when working from home. In other words, experience strengthens the positive association among WFH practices and employee productivity, highlighting its crucial mediating role.
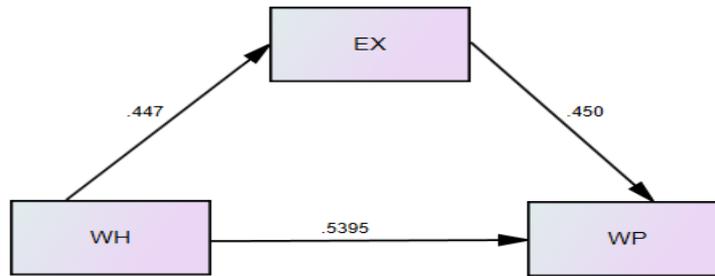
Figure 3: Mediation analysis

Table 14: Mediation Analysis

Total impact of X on Y						
Effect	SE	t	p	LLCI	ULCI	c'_cs
0.6362	0.0571	-7.2925	0	-0.5288	-0.3035	-0.4903
Direct impact of X on Y						
Effect	SE	t	p	LLCI	ULCI	c'_cs
0.5395	0.0545	6.7781	0	0.4771	0.2618	0.4353
Indirect effect(s) of X on Y:						
	Effect	BootSE	BootLLCI		BootULCI	
Exp	0.447	0.0229	0.0944		0.0037	
CSIE(s) of X on Y:**						
	Effect	BootSE	BootLLCI		BootULCI	
Exp	0.45	0.0262	0.1072		0.0045	

Note: **Completely standardised indirect effect.
Source: Author's compilation.

5. Conclusion

This study demonstrates that among the factors influencing worker productivity and well-being in WFH arrangements, work-life balance (WB) is the greatest critical determinant (β = 0.57), next by social connection (SC) (β = 0.47) and communication and collaboration (CC) (β = 0.39). These

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findings reinforce existing theories of work-life integration and social exchange, highlighting their central role in sustaining performance in remote contexts. The mediation analysis further shows that experience amplifies the positive influence of WFH factors by 47%, contributing to human capital theory by demonstrating how accumulated experience enhances adaptability and productivity in remote work settings. While the research delivers appreciated visions, it is subject to certain demeritss, including reliance on cross-sectional, self-reported data, potential biases in the SEM approach, and limited generalizability due to its focus on specific districts in Kerala. Future research should employ longitudinal and mixed-method approaches, expand across industries and geographies, and test additional moderators such as organizational support, leadership style, and technological readiness to refine theoretical models. In conclusion, the outcomes emphasise the significance of work-life balance, social connection, and effective communication, with experience acting as a key mediator. For organizations, this implies adopting strategies that enhance work-life integration, strengthen collaboration, and build employee adaptability to ensure sustainable productivity and well-being in the evolving world of work.

To improve productivity and well-being in remote work, organisations should set clear expectations, provide necessary resources, and ensure reliable technological support. Regular communication, collaboration, and constructive feedback are vital to keeping employees engaged, while flexible work hours and breaks help prevent burnout. Supporting mental and physical health through wellness initiatives, along with opportunities for skill development and recognition, fosters motivation and growth. Additionally, encouraging social interaction through virtual team-building and continuously refining policies based on employee feedback can generate a helpful and adaptive remote work culture that sustains long-term success.

Future research on work-from-home (WFH) should include longitudinal studies to assess long-term impacts on productivity and well-being, as well as comparative studies across industries, organizational sizes, and regions to identify sector-specific challenges and best practices. Qualitative approaches like interviews and focus groups can reveal employees' subjective experiences, while investigations into hybrid models and technological integration (e.g., AI tools, virtual collaboration) can highlight ways to enhance efficiency and engagement. Cross-cultural research, along with studies on psychological factors such as motivation and resilience, will deepen understanding of employee experiences, whereas examining policy frameworks can guide effective regulation and support. Additionally, research on employee engagement, organizational culture, and health initiatives will help determine strategies to sustain belonging, teamwork, and overall well-being in remote work contexts.

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Relationship between Customer Satisfaction and Loyalty to Bank Financial Performance: Insights from PMJDY Account Holders

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Abstract: This study investigates the relationship between satisfied and loyal clients and the profitability of Indian banks serving PMJDY account holders. The connection has been examined using multivariate techniques, specifically Partial Least Squares Structural Equation Modelling (PLS-SEM), to explore the complex interplay between customer satisfaction, loyalty, and financial performance. A significant gap in the literature on financial inclusion and banking outcomes in India has been addressed. The fundamental links between customer satisfaction and loyalty, as well as their influence on banks' financial success, have been analysed. A clear association has been identified between customer satisfaction and financial outcomes, with customer loyalty recognised as a pivotal mediating factor. The impact of satisfaction and loyalty on bank performance has been explored, particularly in the context of financial inclusion initiatives such as PMJDY. Valuable insights have been generated for policymakers and banking institutions, enabling the development of strategies focused on customer retention to enhance both inclusion and financial performance.

1. Introduction

Significant changes have been observed in the Indian banking sector in recent years. These changes have been driven by technological progress and the rise of digital financial services. As highlighted by Iqbal et al. (2021), the traditional banking structure has been transformed, with cashless transactions becoming increasingly common due to the adoption of internet banking and e-commerce. This shift has been facilitated by the widespread availability of mobile phones and internet access, through which financial opportunities have been extended to previously unbanked populations. One major initiative contributing to this transformation has been the Pradhan Mantri Jan-Dhan Yojana (PMJDY). This national program has been designed to promote financial inclusion by offering basic banking services, such as savings accounts, remittance facilities, credit, insurance, and pensions to underserved communities (Kusuma et al., 2023; Shaikh et al., 2024). Although access to formal banking has been significantly expanded through PMJDY, several challenges have yet to be addressed. These include the enhancement of financial literacy, the improvement of credit delivery mechanisms, and the integration of excluded populations into the broader financial system (Malpani et al., 2024). Despite the extensive outreach achieved by PMJDY, a notable gap in research has been identified regarding the impact of customer satisfaction and loyalty among PMJDY account holders on the financial performance of banks. Most existing studies have concentrated on financial inclusion metrics or localised service evaluations. For example, customer satisfaction based on account usage duration was assessed in Chennai by Palamalai et al. (2021). Rahman (2013) examined perceptions related to service reputation and cost, while Bijoy (2018) attempted to establish a link between satisfaction, loyalty, and bank profitability but did not identify a clear causal relationship. Patnaik et al. (2016) evaluated the program's effectiveness in Orissa without considering the financial implications of customer behaviour. This body of literature has revealed an essential gap. A detailed analysis connecting customer satisfaction and loyalty to bank performance within the PMJDY framework has not been conducted. Understanding this connection has become increasingly

important. It has been observed that satisfied and loyal customers are more likely to maintain long-term banking relationships, utilise additional services, and contribute to stable revenue streams. Recent studies employing multivariate analysis and Partial Least Squares Structural Equation Modelling (PLS-SEM) have begun to investigate these complex relationships (Kamath et al., 2019; Omoregie et al., 2019). These analytical methods have provided valuable tools for examining how constructs such as trust, satisfaction, and loyalty influence measurable financial outcomes for banks. In the context of PMJDY, such analysis holds particular relevance. Although individual account holders from lower-income groups may not generate substantial revenue, their collective engagement has the potential to significantly influence a bank's financial health. Accordingly, this study has been undertaken to explore how the satisfaction and loyalty of PMJDY customers affect profitability and to establish a link between financial inclusion policy and performance-based banking strategy.

2. Theoretical Foundation and Review of Literature

The relationship between customer satisfaction, loyalty, and financial performance has long been a central focus in banking research. However, applying this framework to financial inclusion programs like the Pradhan Mantri Jan-Dhan Yojana (PMJDY) has received limited attention. Recent studies are starting to close this gap, providing insights into how satisfaction and loyalty among PMJDY account holders affect bank financial health. Sahoo and Sood (2024) conducted an in-depth study using Partial Least Squares Structural Equation Modelling (PLS-SEM) to explore the relationships between customer satisfaction, loyalty, and bank performance within the PMJDY context. Their findings show that customer satisfaction strongly influences loyalty. Loyalty, in turn, partly mediates the connection between satisfaction and financial performance. This supports the notion that retaining satisfied customers can lower acquisition costs and boost profitability. Customer satisfaction is increasingly recognised as a strategic asset in inclusive banking. Studies by Sharma and Gupta (2022) and Reddy and Divya (2025) highlight that satisfaction among PMJDY beneficiaries is influenced by service accessibility, staff empathy, and digital literacy. Mishra and Sahoo (2020) found that mobile banking features significantly enhance satisfaction, especially among younger users. Loyalty in PMJDY banking is shaped by trust, service consistency, and perceived value. Aripin (2025) identifies service quality and grievance redressal as crucial factors boosting loyalty. Singh and Mehta (2024) argue that loyalty leads to reduced churn and increased cross-selling, particularly in semi-urban branches. Recent studies confirm a positive link between customer experience and bank performance. Kumar and Singh (2021) demonstrate that engaged PMJDY customers enhance operational efficiency and profitability. Jain and Patel (2023) report that banks with higher satisfaction scores have better financial KPIs, including deposit growth and lower account dormancy. The mediating role of loyalty has gained attention in recent empirical models. Verma and Kapoor (2024) used structural equation modelling to show that loyalty significantly enhances the impact of satisfaction on financial performance. Das and Rout (2023) support this view, noting that trust-based loyalty promotes repeat usage and long-term engagement. Choudhury and Sen (2022) stress that loyalty must be earned through consistent service delivery and open communication. Their longitudinal study shows that sustained satisfaction leads to lasting loyalty, which drives profitability. Bansal & Kaur (2020) suggest that inclusive banking models can be financially viable when customer experience is a priority. Joshi & Thakur (2022) note that customer-focused innovations, such as biometric authentication and multilingual support, enhance loyalty by improving usability and reducing friction. Sinha and Mohanty (2023) further illustrate that financial literacy programs strengthen loyalty by empowering users to make informed decisions. Verma & Kapoor (2024) emphasize that satisfaction is not just transactional but also emotionally tied to trust, dignity, and perceived fairness. These findings align with broader frameworks on service quality, where responsiveness and reliability are key drivers (Roy & Dasgupta, 2021). Mittal et al. (2023) review over 40 years of research through a meta-analysis of 245 studies, confirming that customer satisfaction positively relates to both individual outcomes (like retention, word-of-mouth, and spending) and firm-level outcomes (such as accounting and market performance). Though not specific to PMJDY, their work reinforces the theoretical basis connecting satisfaction and loyalty to financial success. Kumar & Peerzade (2021) examined changes in Indian banking post-liberalization. They noted that customer satisfaction has become a critical differentiator, especially as banks compete based on service quality rather than just products. Their study shows how

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private sector banks have used customer-focused strategies to outperform public sector banks, a relevant insight for PMJDY, largely implemented through public banks. The Balanced Scorecard (Kaplan & Norton, 1992) provides a strategic framework connecting non-financial metrics like customer satisfaction and loyalty with financial outcomes. In the context of PMJDY, this framework is relevant as it allows banks to gauge how improvements in service quality and customer experience among financially included populations translate into profitability and sustainability. Studies by Jamal & Naser (2003), Murphy et al. (1996), and Speth et al. (1977) underscore that customer satisfaction serves not only as a performance benchmark but also as a driver of loyalty and repeat engagement. In banking, particularly among PMJDY account holders, satisfaction fosters long-term relationships, reduces churn, and creates cross-selling opportunities, enhancing financial performance. The changing expectations of banking customers (Lewrick et al., 2010; EY Report, 2017) and the commoditization of banking services (Gilbert & Royne Stafford, 2022) underscore the necessity for banks to stand out through superior service. For PMJDY beneficiaries, who often represent first-time formal banking users, service quality and perceived value are crucial in building loyalty and ongoing usage.

While financial inclusion initiatives like the PMJDY have greatly increased access to banking, current literature largely emphasises quantitative outreach measures like account penetration and transaction volumes over the quality of customer experience.

Specifically, there is a lack of empirical studies examining how customer satisfaction and loyalty among PMJDY beneficiaries affect banks' financial performance. Moreover, the role of customer loyalty as a mediator in this relationship has been insufficiently explored, particularly within the socio-economic context of low-income and rural populations. Previous research often overlooks the behavioural and attitudinal factors that drive sustained engagement with banking services, which are vital for the long-term success of financial inclusion efforts. This study addresses these gaps by integrating customer-focused variables into a performance-oriented framework, offering a deeper understanding of how satisfaction and loyalty contribute to bank profitability and operational success within the PMJDY scheme. The study have the following objectives:

- To examine the direct impact of customer satisfaction on the financial performance of a bank serving PMJDY account holders.
- To measure the relationship between customer satisfaction and customer loyalty among PMJDY beneficiaries.
- To evaluate the effect of customer loyalty on the financial performance of banks operating under the PMJDY scheme.
- To analyse the mediating role of customer loyalty in the relationship between customer satisfaction and bank financial performance.

2.1. Customer Satisfaction and Loyalty

How clients perceive and expect the quality of services from a bank is essential for its success. Bitner et al. (2000) state that financial institutions looking to gain and maintain a competitive edge must consider these views. This helps them assess the market, create a service delivery system that meets customer expectations, and improve service performance. Many people are interested in this topic because of the strong connections between service quality and factors like spending, profitability, satisfied clients, and loyalty. The literature mainly focuses on face-to-face interactions between customers and employees, examining the relationship between service quality and customer satisfaction, and financial performance. Technology improvements have also affected service marketing (Paul et al., 2016; Dabholkar & Bagozzi, 2002). This has led to more ways of delivering services. When service companies use technology, they gain competitive advantages like improved efficiency, fewer barriers to entry, and increased revenue from new products (Bitner, 2001). These are just a few of the benefits. The quality of services offered is key to determining whether an effort will succeed. Both academics and marketing professionals consistently focus on customer satisfaction and loyalty. Research shows a strong link between high-quality service and satisfied, loyal customers, which boosts a company's profits. There are various ways to assess service quality, including how well it meets clients' needs (C. Banerjee, 2021). In today's business climate, providing top-quality service is critical, especially given the intense competition. Zeithaml et al. (2001) suggest that a

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company that consistently delivers high-quality services earns a better reputation. This makes it easier to keep existing customers and attract new ones through positive word of mouth. A company's ability to thrive and maintain its market position heavily relies on the quality of its services. Banks can stand out from competitors by offering high-quality service (Gao et al., 2008). The satisfaction level of customers in retail banking has been widely studied (Utkarsh, 2022). Service quality is a crucial element in this industry. Research (Zeithaml et al., 2001) indicates that to succeed today, a company must provide excellent customer service. Customer service matters for any business, whether it's online or in a brick-and-mortar store. A. Banerjee & Gupta (2019) highlight the importance of understanding what makes consumers happy in today's fast-paced business environment. Chitturi et al. (2008) found that if a customer's actual purchasing experience falls short of their expectations, it negatively affects their satisfaction with the product or service. After using and paying for a product or service, their satisfaction also relates to their feelings about it. Feedback from customers after using a product or service shows that their needs have been met (Oliver, 1991). Research demonstrates that customer satisfaction plays a crucial role in linking happy customers to repeat business. Customers with PMJDY accounts who are satisfied with their services, such as financial inclusion initiatives, ease of use, and product options, are more likely to build trust and loyalty toward the bank. As customers see that their relationship with the bank continues to provide value, they are more inclined to stay loyal.

2.2. Customer Satisfaction and Financial Performance

When assessing a bank's financial performance, one of the most important factors is customer satisfaction. Happy customers are more likely to return for additional services, engage in repeat transactions, and deepen their relationship with the bank. For PMJDY account holders, their level of engagement closely relates to how accessible, reliable, and responsive they find the bank's services. Drawing from the Service-Profit Chain framework, satisfied customers help build a stable client base. They also contribute to increased revenue by using a wider range of banking products. Higher customer retention lowers the cost of acquiring new clients and boosts overall profitability. This indicates a strong positive link between customer satisfaction and a bank's financial success. PMJDY beneficiaries are particularly receptive to efforts that promote financial inclusion and improve services. This is especially true for banks serving economically vulnerable groups. When these banks provide services that meet customer needs, they not only fulfil their social responsibility but also improve their financial results. In summary, investing in customer satisfaction is not only a good practice but also a smart strategy that pays off.

2.3. Customer Loyalty and Financial Performance

Customer loyalty is crucial for a bank's financial success. Loyal clients often use financial services more often, connect more deeply with the institution, and are less likely to switch to other banks. For banks that serve PMJDY account holders, loyalty leads to consistent revenue, lower customer turnover, and a stronger brand image, often enhanced through positive word-of-mouth. The Satisfaction-Loyalty-Profit Chain provides a helpful way to understand this relationship. When customers are satisfied, they are more likely to remain with the bank and try additional services, going beyond basic offerings like savings accounts. This not only creates more opportunities to cross-sell but also improves long-term profitability and sustainability. For PMJDY, loyal customers are more likely to engage financially, benefiting both themselves and the bank. As their trust builds, so does their eagerness to adopt broader financial products, which in turn leads to better financial results for the bank. In summary, fostering loyalty among PMJDY account holders is not only good for customer relations; it is a strategic tool for financial growth.

2.4. Customer Loyalty among Customer Satisfaction and Financial Performance

Customer loyalty plays a key role in connecting customer satisfaction and a bank's financial success. When clients have positive experiences, they are more likely to stay loyal, resulting in stronger relationships and a steadier revenue stream. According to Relationship Marketing Theory, loyalty strengthens the link between satisfaction and financial performance by promoting long-term

engagement and boosting customer lifetime value. For banks serving PMJDY account holders, loyalty offers several benefits: increased use of banking products, repeat transactions, and greater client involvement. These behaviours reinforce the customer-bank relationship and contribute to ongoing profitability. Satisfied PMJDY customers, who feel their needs are met, are more likely to continue banking with the institution and explore additional services. In this context, customer loyalty serves as a crucial link, transforming satisfaction into real financial results. It's through this pathway that banks can achieve consistent success, especially when serving financially vulnerable populations. Therefore, institutions focused on PMJDY initiatives can reasonably expect that enhancing customer satisfaction will lead to greater loyalty, which in turn drives financial performance.

Based on the above the following hypothesis are developed:

- H1: Customer satisfaction positively influences the financial performance of banks serving PMJDY account holders.
- H2: Customer satisfaction positively influences customer loyalty among PMJDY account holders.
- H3: Customer loyalty positively influences the financial performance of banks serving PMJDY account holders.
- H4: Customer loyalty mediates the relationship between customer satisfactions and influences the financial performance of banks serving PMJDY account holders.

3. Research Methodology

A stratified random sampling technique will be employed to ensure representation across different regions (urban, semi-urban, and rural) and banking institutions (public and private sector banks). This approach helps capture diverse customer experiences under the PMJDY scheme. Based on Cochran's formula for large populations, a sample size of approximately 220 respondents will be targeted to achieve statistical significance and generalizability. Data collection will be conducted over three months, from different cities in Odisha, like Cuttack, Berhampur, Sambalpur, and Bhubaneswar etc., allowing for seasonal variations in banking activity and customer engagement to be accounted for. The study will focus on PMJDY account holders, specifically: Individuals from low-income households who have opened accounts under the financial inclusion initiative Customers who have actively used their accounts for transactions (e.g., deposits, withdrawals, DBT receipts)Respondents aged 18 and above, capable of providing informed consent Inclusion Criteria: Must have held a PMJDY account for at least six months Must have interacted with banking services (branch visits, mobile banking, etc.) at least once in the past three months Exclusion Criteria: Dormant account holders Respondents unwilling to participate or unable to comprehend the survey.

During the course of the studies that were carried out, both SEM and CFA were used. SEM is statical method that is used for purpose of examining intangible aspect of business. These aspects include the amount of customer satisfaction and loyalty as well as the financial performance of these companies. For measurement, the structural equation model (SEM) makes use of both formative and reflective approaches. The findings were validated not only by the factor loading, but also by several reliability tests that were carried out with the help of CFA. Joseph F. Hair and colleagues (2018) and Sarstedt and colleagues (2020). In complex models with small sample sizes, the PLS-SEM approach may be used to identify the factors that have an impact on the correlations that exist between variables. Through the process of determining the components that affect the connections, this may be done. With the aid of this method, it is possible to determine the features that affect the connection that exists between variables. One further use that may be made of this method is the determination of correlations between the various variables that are being studied. For the purpose of gathering information from each of the research sites, a mix of anonymous online surveys and in-person interviews is used.

Table 1: Variable Description

Component	Description
Approach	Quantitative, using survey-based data collection
Population	PMJDY account holders across selected regions in India
Sampling Method	Stratified random sampling to ensure representation across demographics.
Data Collection	Structured questionnaire measuring satisfaction, loyalty, and service usage
Analysis Technique	PLS-SEM (Partial Least Squares Structural Equation Modelling)
Framework	Balanced Scorecard (Kaplan & Norton, 1992)

Source: Authors' collection.

4. Results and Discussion

Table 2:Reliability and Validity Study Measures

Constructs	Item	Factor Loading	Cronbach's Alpha	CR	AVE
PMJDY Customer Loyality	CL1	0.794	0.836	0.889	0.666
	CL2	0.792			
	CL3	0.706			
	CL4	0.785			
PMJDY Customer Satisfaction	CS1	0.734	0.770	0.853	0.593
	CS2	0.808			
	CS3	0.721			
	CS4	0.715			
Bank Financial Performance	FP1	0.838	0.732	0.833	0.555
	FP2	0.850			
	FP3	0.785			
	FP4	0.789			

Sources: Author's calculation.

To confirm the strength of the constructs in this study, PMJDY customer loyalty, PMJDY customer satisfaction, and bank financial performance reliability and validity analyses were conducted. In Table 2, the psychometric properties of each construct are presented, including factor loadings, Cronbach's alpha, composite reliability, and average variance extracted. Satisfactory loadings (>0.70) were observed for all items, indicating strong item reliability. Cronbach's alpha values for customer loyalty (0.836), customer satisfaction (0.770), and financial performance (0.732) were found to exceed the recommended threshold of 0.70, thereby confirming good internal consistency (Nunnally & Bernstein, 1994). Furthermore, composite reliability (CR) scores ranging from 0.833 to 0.889 were recorded for all constructs, surpassing the minimum requirement of 0.70 and confirming construct reliability. The average variance extracted (AVE) values for customer loyalty (0.666), customer satisfaction (0.593), and financial performance (0.555) met the standard cutoff of 0.50, thereby establishing convergent validity (Fornell & Larcker, 1981). Through these results, the reliability and validity of the measurement model were affirmed, providing a robust foundation for subsequent structural analysis and hypothesis testing.

Table 3: Heterotrait-Monotrait Ratio (HTMT) Matrix

Construct	Banking Financial Performance	PMJDY Customer Loyalty	PMJDY Customer Satisfaction
Banking Financial Perroemance			
PMJDY Customer Loyality	0.384		
PMJDY Customer Satisfaction	0.325	0.931	
Fornell-Larcker criterion			
Banking Financial Perroemance	0.816		
PMJDY Customer Loyality	0.326	0.770	
PMJDY Customer Satisfaction	0.272	0.703	0.745

Sources: Author's calculation.

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Discriminant Validity Assessment: To ensure that the constructs in the study, PMJDY customer satisfaction, PMJDY customer loyalty, and bank financial performance were conceptually distinct and non-overlapping, discriminant validity was assessed using two widely accepted methods: the Fornell-Larcker criterion and the HTMT ratio.

Fornell-Larcker Criterion: According to the Fornell-Larcker criterion, the square root of the average variance extracted (AVE) for each construct was compared with its correlations to other constructs. Discriminant validity was confirmed when the square root of the AVE (diagonal values) was found to be greater than the inter-construct correlations (off-diagonal values).

Table 4: Fornell-Larcker

Construct	AVE (Diagonal)	Highest Correlation (Off-Diagonal)
Bank Financial Performance	0.816	0.326 (with Customer Loyalty)
PMJDY Customer Loyalty	0.770	0.703 (with Customer Satisfaction)
PMJDY Customer Satisfaction	0.745	0.703 (with Customer Loyalty)

Sources: Author's calculation.

The Fornell-Larcker criterion was met by all constructs, indicating that more variance was shared with their own indicators than with other constructs. Adequate discriminant validity was thereby confirmed.

Heterotrait-Monotrait (HTMT) Ratio: The HTMT ratio is a more stringent test of discriminant validity, especially in structural equation modelling. Values below 0.85 (or 0.90 in some contexts) suggest that constructs are empirically distinct.

Table 5: HTMT Ratio

Construct Pair	HTMT Value
Bank Financial performance & Customer Loyalty	0.384
Bank Financial Performance &Customer satisfaction	0.325
Customer Loyalty & Customer Satisfaction	0.931

Sources: Author's calculation.

While most HTMT values are well below the threshold, the value between Customer Loyalty and Customer Satisfaction (0.931) slightly exceeds the conservative cutoff of 0.90. This suggests a strong association between the two constructs, which may be expected given their theoretical linkage. However, further testing (e.g., cross-loadings or model re-specification) may be warranted to confirm construct distinctiveness. The discriminant validity results largely support the distinctiveness of the constructs used in this study. The Fornell-Larcker criterion confirms that each construct is sufficiently unique, while the HTMT ratio highlights a strong but theoretically justifiable relationship between customer satisfaction and loyalty. These findings validate the measurement model and support its use in subsequent structural analysis."

Structural Model Assessment: The structural model was evaluated to test the hypothesised relationships among the constructs: PMJDY customer satisfaction, PMJDY customer loyalty, and bank financial performance. Standardised path coefficients and p-values were examined to determine the strength and statistical significance of these relationships.

Table 6: Path Coefficients and Hypothesis Testing

Hypothesized Path	Path Coefficient	P-value	Interpretation
Customer Satisfaction → Customer Loyalty	0.703	0.000	Strong, significant Positive relationship
Customer Loyalty → Bank Financial	0.266	0.000	Moderate, significant

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Performance			positive relationship.
Customer Satisfaction→ Bank Financial Performance	0.084	0.134	Weak, non-significant direct relationship

Sources: Author's compilation.

H1: Customer Satisfaction positively influences Customer Loyalty. Supported. The path coefficient of 0.703 with a p-value < 0.001 indicates a strong and statistically significant relationship. This suggests that higher satisfaction among PMJDY account holders leads to increased loyalty toward their banking institution.

H2: Customer Loyalty positively influences Bank Financial Performance. Supported. The coefficient of 0.266 and p-value < 0.001 confirm a significant positive impact. Loyal customers contribute to improved financial outcomes, possibly through repeat transactions, reduced churn, and positive word-of-mouth.

H3: Customer Satisfaction directly influences Bank Financial Performance. Not Supported. Although the path coefficient is 0.084, the p-value of 0.134 indicates that this direct effect is not statistically significant. This implies that satisfaction alone may not directly translate into financial performance unless mediated by loyalty

Implications: The model suggests a mediated pathway where Customer Satisfaction enhances Bank Financial Performance indirectly through Customer Loyalty. This aligns with service marketing literature, which posits that satisfaction fosters loyalty, and loyalty, in turn, drives financial outcomes. The structural model confirms that Customer Loyalty plays a pivotal mediating role between Customer Satisfaction and Bank Financial Performance in the context of PMJDY account holders. While satisfaction alone does not directly impact financial performance, its influence is channeled effectively through loyalty behaviours. These findings underscore the strategic importance of nurturing customer loyalty to achieve sustainable financial outcomes in inclusive banking initiatives.

Path Analysis and Hypothesis Testing

H4:To evaluate the structural relationships among the constructs PMJDY Customer Satisfaction, PMJDY Customer Loyalty, and Bank Financial Performance, a path analysis was performed using standardized coefficients, t-statistics, and p-values. The results have been summarized in Table 3 and interpreted as follows.

Direct Relationships Customer Loyalty → Bank Financial Performance A path coefficient of 0.266 was recorded, with a t-statistic of 4.556 and a pvalue of 0.000, indicating a statistically significant relationship at the 1% level. The hypothesis that loyal PMJDY account holders contribute positively to bank financial performance was supported. This contribution is likely facilitated through sustained engagement, reduced churn, and increased uptake of banking services.

Customer Satisfaction → Bank Financial Performance A coefficient of 0.084 was observed, with a t-statistic of 1.498 and a p value of 0.134, suggesting that the direct effect of satisfaction on financial performance was not statistically significant. It was implied that satisfaction alone may not directly enhance financial outcomes unless its influence is mediated by loyalty.

Customer Satisfaction → Customer Loyalty The strongest direct relationship in the model was identified, with a coefficient of 0.703, a t-statistic of 22.032, and a p-value of 0.000. This confirmed that customer satisfaction significantly drives loyalty among PMJDY account holders. The result aligns with service marketing theory, in which satisfaction is regarded as a key antecedent of loyalty.

Implications: Customer Satisfaction → Customer Loyalty → Bank Financial Performance An indirect effect of 0.187 was recorded, with a statistic of 4.378 and a p-value of 0.000, indicating a statistically significant mediation. It was confirmed that customer loyalty acts as a mediator, channeling the influence of satisfaction into improved financial performance. In essence, satisfied customers were found to be more likely to become loyal, and it is this loyalty that ultimately enhances bank profitability. Through path analysis, the conceptual model was validated by confirming that customer loyalty serves as a critical link between customer satisfaction and bank financial

performance in the PMJDY context. Although satisfaction alone does not directly impact financial outcomes, its influence was effectively transmitted through loyalty behaviours. These findings underscore the strategic importance of fostering loyalty among financially included populations to achieve sustainable banking performance.

The findings support existing literature that identifies loyalty as a strategic lever for financial success in inclusive banking contexts. Mediation analysis further confirms that loyalty serves as a vital conduit through which satisfaction drives financial outcomes. The study emphasizes the importance of cultivating both satisfaction and loyalty among PMJDY account holders in Odisha, where drivers such as service accessibility, trust, and transparent communication significantly enhance satisfaction. By aligning customer experience metrics with financial goals under the Balanced Scorecard framework, banks in these cities can strengthen their competitive advantage and ensure long-term sustainability. Ultimately, the study contributes to both academic theory and practical banking strategy by demonstrating that inclusive finance initiatives like PMJDY are not only socially transformative but also financially viable when customer-centric approaches are prioritized.

The Pradhan Mantri Jan Dhan Yojana (PMJDY) is a key financial inclusion initiative introduced by the Government of India to bring individuals previously excluded from the formal banking system into the financial mainstream, encouraging poverty reduction and enabling access to essential banking services such as savings, insurance, credit, and money transfer facilities. Research indicates that customer satisfaction and loyalty play a vital role in the success of banking services, and this holds true for PMJDY beneficiaries as well. In line with the findings of the study, it is recommended that banks offering PMJDY services focus on strengthening the drivers of satisfaction and loyalty, as these factors have a positive association with the financial performance of banks serving PMJDY account holders.

5. Conclusion

The relationship between customer satisfaction, loyalty, and bank financial performance within the framework of the Pradhan Mantri Jan Dhan Yojana (PMJDY) was investigated in this study, with a focus on financial institutions located in the Odisha cities of Cuttack, Berhampur, Sambalpur, and Bhubaneswar. A critical research gap was addressed by examining how behavioural dynamics among financially included populations, often underrepresented in mainstream banking literature, translate into measurable institutional outcomes. Guided by well-defined objectives and hypotheses, structural equation modelling was employed to test both direct and mediated relationships. It was revealed that customer satisfaction does not directly influence financial performance, but significantly enhances customer loyalty, which in turn positively affects bank profitability.. Future research may extend this work by exploring longitudinal trends, regional comparisons across other states, and the role of digital engagement in strengthening customer relationships within financially underserved communities. The study's results indicate a strong link between customer satisfaction and loyalty among PMJDY account holders. Individuals who feel satisfied with their banking experience tend to maintain stronger ties with their banks and are more inclined to utilize the available products and services.

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Gender Diversity and Organizational Outcomes in Indian Software Industry: Evidence from Workforce, Board, and HR Practices

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Abstract: Gender diversity at work spaces has increasingly become an area of academic and corporate interest, particularly in the tech industry where systemic imbalances are prevalent along with gross underrepresentation of women. This study explores the relationship between gender diversity and a number of key organizational - level outcomes. Building on RBV as well as Social Role Theory, the model comprises various antecedents for organizational performance, workforce diversity, board representation, gender-friendly HR practice, inclusion programs and leadership support. Independent factor analysis was conducted using data collected from 400 feet-on-street professionals in two IT hubs of India through cross-sectional survey design and EFA, CFA and SEM techniques. The results show that labour gender diversity, gender sensitive HR practices have a positive and significant effect on the retention of employees and innovation but not for board gender diversity in terms of retention. Impact of the inclusion strategies were modest but clear demonstration of contextual enablers. The results emphasise the significance of mid-level diversity and present a model to enrich gender diversity in Indian IT that has been empirically validated, presenting useful implications for practice, policy and future research.

1. Introduction

Gender diversity in the workplace has received significant academic and corporate attention, particularly within high-growth fields like Information Technology (IT). The underrepresentation of women in IT is a global issue that highlights long-standing structural inequalities and non-inclusive organizational cultures (Annabi & Lebovitz, 2018). Although there have been gradual improvements, women continue to face barriers such as stereotyping, lack of mentorship, pay inequity, and restricted access to leadership positions (Shannon et al., 2019). These challenges are especially pronounced in software firms, where value is placed heavily on technical competence and innovation domains historically dominated by men (Díaz-García et al., 2013). The gender imbalance in IT is not just a social concern but also a performance and governance issue. Diverse teams have consistently demonstrated superior problem-solving and innovation outcomes (Woolley et al., 2010; Gomez & Bernet, 2019). Gender diversity in boards and top management has also been positively associated with firm value, sustainability initiatives, and responsiveness to stakeholder needs (Brahma et al., 2021; Lu & Herremans, 2019; Ben-Amar et al., 2017). These findings underscore the importance of understanding interventions that promote gender diversity in IT work environments.

The McKinsey report Delivering Through Diversity (Woetzel et al., 2018) provides compelling evidence that firms in the top quartile for gender diversity are 21% more likely to outperform their peers financially. Similarly, Hunt, Layton, and Prince (2015) found that gender-diverse organizations enjoy competitive advantages through talent attraction and customer understanding. While this "business case" for gender diversity is well-established globally, Indian IT firms continue to exhibit significant gender asymmetry, particularly in leadership and technical roles. Kundu and Mor (2017) observed positive links between gender diversity and firm performance in Indian IT firms but

highlighted that progress remains slow. This persistence of exclusion is driven by cultural norms, insufficient institutional support, and entrenched male networks (Atal et al., 2019).

Cultural and structural barriers exacerbate these challenges. Tatli et al. (2017) argue that organizations often place the responsibility for gender equality on women themselves, rather than reforming institutional norms. Similarly, Kossek et al. (2017) noted that many women "opt out" of IT roles due to hostile workplace conditions, despite having equal qualifications. These patterns impede women's retention and advancement. The notion of "critical mass" (Joecks et al., 2013) suggests that a token presence of women is insufficient to influence governance; substantive and empowered representation is required. Kim and Starks (2016) further argued that women contribute distinctive governance and leadership capabilities, reinforcing the case for gender-diverse top management teams. Yet, women remain underrepresented in boardrooms across Indian software firms. Regional and sectoral effects matter too studies such as Marinova et al. (2016) and Mateos de Cabo et al. (2012) have shown that board-level gender diversity enhances innovation, employee engagement, stakeholder trust, and risk perception. These international patterns highlight the need for context-specific inquiry into gender inclusion within Indian software companies.

Tech companies also play a crucial role in shaping inclusive workplace cultures. Annabi and Lebovitz (2018) introduced the Organizational Interventions Model for Inclusive Barriers (OIMIB), which identifies targeted interventions such as mentoring programs, flexible work arrangements, and inclusive evaluation systems that help women overcome both individual and systemic challenges in IT workplaces. Their findings in American IT firms demonstrated that these interventions significantly improve women's retention and advancement. This perspective is echoed by Rao and Tilt (2016), who found that gender-inclusive CSR enhances innovation and brand identity in technology-based industries. However, the effectiveness of such diversity initiatives depends heavily on organizational climate and implementation (Nishii, 2013). In environments characterized by long work hours and competitive, performance-based cultures, inclusion not mere representation is critical to prevent tokenism or backlash (Williams et al., 2012). Moreover, structural reforms such as quotas are insufficient without corresponding cultural and leadership commitments (Terjesen et al., 2015; Adams, 2016).

This intersection of structure and agency is particularly pronounced in India, where social norms often constrain women's labor force participation. Goldin (2014) referred to this as the "last chapter" of gender convergence where institutional barriers, rather than personal capabilities, sustain gender gaps. In Indian IT companies, women are well represented at entry levels but remain scarce in senior roles. Furthermore, organizational efforts to promote gender diversity often emphasize quantitative targets over qualitative inclusion. Reguera-Alvarado et al. (2017) found that simply increasing women's board representation does not automatically enhance performance unless accompanied by supportive policies and inclusive cultures. Hence, real progress requires organizations to empower women with decision-making authority and leadership opportunities.

Gender-diverse boards have also been linked to stronger environmental, social, and governance (ESG) outcomes. Nadeem et al. (2017) demonstrated that firms with greater female representation exhibit higher CSR engagement and ethical accountability. These findings are particularly relevant for software firms, whose reputations increasingly depend on responsible and inclusive business practices. At the same time, the growing use of AI-driven recruitment and HR systems introduces new equity challenges. Hunkenschroer and Luetge (2022) caution that algorithmic biases in these systems may unintentionally perpetuate or amplify gender disparities an issue that warrants examination in the Indian IT sector.

With overwhelming global evidence demonstrating that gender diversity improves innovation, governance, and performance, the Indian IT sector presents a paradox: it leads in technological progress yet lags in gender inclusivity. Despite rich international scholarship on gender diversity, there remains a lack of empirical research examining how Indian software firms implement gender

diversity practices and how these practices affect organizational performance, employee satisfaction, and leadership representation. Addressing this gap is crucial for both academic and practical reasons, as the findings can inform evidence-based policy, corporate governance, and human resource management strategies. This study therefore seeks to explore the impact of gender diversity practices in leading Indian software companies, offering contextually grounded insights that can support inclusive growth, innovation, and sustainable corporate governance.

2. Review of Literature

The theoretical and empirical bases of our study are based on a multi-disciplinary consolidation of theory and evidence that explain connections between gender diversity and performance, in the context of IT/Software industry. At the core of this model is the idea that gender diversity audits and practiced inclusively can greatly improve employee-related results (engagement, satisfaction, retention) and firm-level variables (like innovativeness, risk management or financial performance) (Gomez & Bernet, 2019; Reguera-Alvarado et al., 2017).

The work is rooted in two principal theoretical bases, namely the Resource-Based View (RBV), and Social Role Theory. According to the RBV, diversity of human capital, such as sex-diversity, is a VRIN (valuable, rare inimitable and non-substitutable) resource that can create competitive advantages for organizations (Kim & Starks, 2016). This is due to the fact that in heavily innovative environments like software industry, gender diverse teams present wider range of point of views, cognitive styles and solution strategies which combined are helpful for improving decision quality (Díaz-García et al., 2013). In reciprocal, SRT argues that gender roles which are a product of sociocultural expectations impact individual behaviour and social cognition in the workplace (Williams et al., 2012). This lens is helpful in shedding light on the enduring absence of women from leadership positions (which does not occur primarily for lack of ability or merit; Kossek, Lautsch, & Eaton, 2006) but stems from structural expectations and gendered scripts (e.g., Schein, 2016). Together, they are the basis of a strong theoretical rationale for gender diversity as potentially beneficial (or not) and how that depends on supportive and inclusive organizational practices.

The independent variable: gender diversity In the conceptual framework presented in this paper, gender diversity is considered as an independent variable and its observation occurs at two basic levels. First, Gender diversity at the workforce level Diversity of gender in the workplace refers to having women represented across all functions and levels, such as entry-level roles, middle management jobs, leadership teams (senior executives) or technical roles. Second, board-and executive-level diversity is about the presence and influence of females in high-stakes decision-making and governance positions (Joecks et al., 2013). It means number representation only is not enough to motivate performance. As proposed by Kundu and Mor (2017) and Atal et al. (2019), "inclusive" inclusion characterized by participation in decision-making, visible leadership, and advancement opportunities is required to capitalize on the value that gender diversity has to offer. Therefore, this study has taken into account not only the gender diversity at quantitative level into consideration but also qualitatively -in terms of the degree to which women become active players in major institutional structures. The hypotheses of this study are derived from empirical evidence and established theoretical reasoning. Each hypothesis is preceded by a conceptual argument explaining the logical basis for its formation.

2.1. Workforce Gender Diversity and Employee Retention

Workforce gender diversity significantly shapes employee experiences, especially in knowledge-intensive sectors like software development. Gender-balanced teams foster better communication, fairness perceptions, and psychological safety, which collectively enhance organisational commitment and retention (Annabi & Lebovitz, 2018; Atal et al., 2019). Empirical evidence from Indian IT firms (Kundu & Mor, 2017) indicates that female-supportive workplace policies correlate with higher employee embeddedness and lower turnover rates. These findings suggest that diversity not only improves equity but also strengthens retention through inclusiveness and engagement.

H1: Workforce gender diversity has a significant positive effect on employee retention in software companies.

2.2. Workforce Gender Diversity and Innovation Output

Innovation, a central pillar of competitiveness in IT, is deeply influenced by the diversity of perspectives within teams. Research demonstrates that gender-diverse research and development groups produce more radical innovations owing to their broader cognitive and problem-solving repertoires (Díaz-García et al., 2013). Woolley et al. (2010) also found that collective intelligence improves with gender diversity, as women enhance cooperation and social sensitivity. In the absence of inclusive practices, however, diversity may lead to conflict rather than innovation. Therefore, effective management of gender diversity can transform heterogeneity into creative synergy.

H2: Workforce gender diversity has a significant positive impact on innovation output in software companies.

2.3. Board Gender Diversity and Innovation Output

Gender diversity at the board level reflects the inclusion of women in strategic decision-making and corporate governance processes. Boards with higher female representation tend to exhibit greater openness to novel ideas and a lower tendency toward groupthink (Joecks et al., 2013). Brahma et al. (2021) observed that female directors often bring collaborative, ethical, and long-term perspectives that sustain innovation performance. Nonetheless, in the Indian context, regulatory mandates have not yet achieved sufficient critical mass for such influence to manifest consistently. Hence, enhancing female participation at the board level remains a vital driver of innovation-oriented governance.

H3: Board gender diversity has a significant positive relationship with innovation output in software companies.

2.4. Gender-Sensitive HR Practices and Employee Retention

Gender-sensitive human resource (HR) practices including flexible work arrangements, mentoring, parental leave, and transparent promotion criteria are essential for fostering fairness and well-being. Annabi and Lebovitz (2018) found that gender-sensitisation initiatives contribute significantly to women's long-term retention in IT careers. Similarly, Rao and Tilt (2016) linked gender-inclusive HR and CSR policies to improved organisational culture and reduced turnover. Tatli et al. (2017) cautioned that such initiatives should be institutionally mandated rather than discretionary. These findings underscore that structural HR support plays a pivotal role in retaining female employees in the Indian software sector.

H4: Gender-sensitive HR practices are positively associated with employee retention in software companies.

2.5. Inclusion Practices and Innovation Output

Inclusion practices operationalise diversity by ensuring participation, equitable decision-making, and recognition. Nishii (2013) asserted that inclusion not mere numerical diversity drives diversity's positive outcomes. When employees perceive fairness in evaluations and team composition, they are more likely to engage in creative collaboration. Kossek et al. (2017) further emphasised that inclusive environments foster psychological safety, which encourages risk-taking and innovation. Hence, inclusion mechanisms are integral to transforming workforce diversity into innovative capacity.

H5: Inclusion practices have a significant positive impact on innovation output in software companies.

2.6. Leadership Commitment and Employee Retention

Leadership commitment to gender diversity sets the organisational tone for equity and inclusion. When senior leaders prioritise diversity goals, allocate resources, and model inclusive behaviour, the legitimacy of gender initiatives increases (Hunt et al., 2015; Woetzel et al., 2018). Adams (2016) highlighted that female executives often face heightened scrutiny, making visible leadership support essential for their success and retention. In India's hierarchical corporate context, leadership endorsement can dismantle traditional power asymmetries and institutionalise inclusive norms.

H6: Leadership commitment to gender diversity has a significant positive effect on employee retention in software companies.
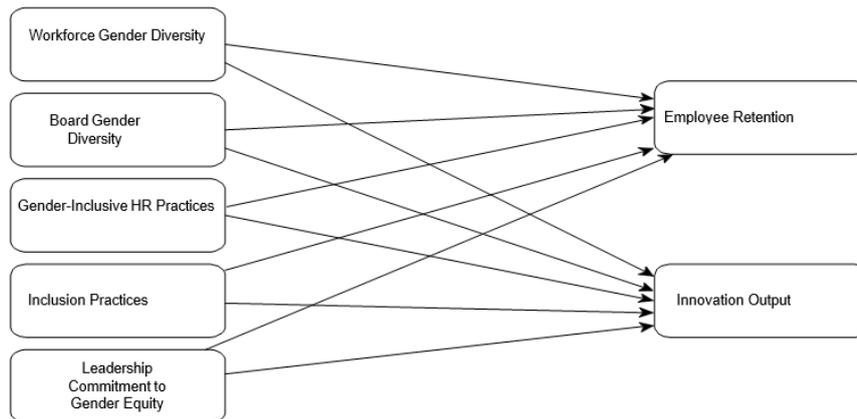
Figure 1: Conceptual Framework

Source: Authors Creation

3. Research Methodology

This section elaborates the methods employed for analyzing the gender diversity and firm performance of specific software firms. The approach incorporates a systematically focused quantitative model for validating the concept and hypotheses. The section offers a detailed presentation of the research design, population and sample, data collection instrument, reliability and validity test procedures and statistical analysis techniques.

3.1. Research Design

This study employs a descriptive–correlational research design using a quantitative, cross-sectional, non-experimental survey approach. The descriptive aspect aims to assess the current status of gender diversity across hierarchical and functional levels within Indian software firms. The correlational component seeks to examine the strength and direction of associations between gender diversity dimensions (independent variables) and organisational outcomes such as employee retention and innovation output (dependent variables). Primary data were collected from employees and managers in mid- to large-scale software companies located in major IT hubs including Bangalore, Hyderabad, Pune, and Chennai. The design was considered suitable for analysing perception-based constructs such as inclusion, HR practices, and leadership commitment that cannot be adequately explored using secondary or experimental data. This framework facilitates hypothesis testing through Structural Equation Modelling (SEM), allowing for the simultaneous examination of multiple interrelated variables and validation of the proposed conceptual model (Creswell, 2014; Kline, 2016).

3.2. Population and Sampling

The focus of our study is software professionals working in mid-sized to large Indian software organizations. These are not just dev [development] people, it's devs, PMs [project managers], HR

and mid-senior level execs. Organizational context The IT-centres where my study organizations are situated, predominantly in the major Indian IT hubs [i.e., Bangalore and Hyderabad have been established as "tech city", Pune and Chennai are likewise upwards potential] that have become globally recognised the hotspots for software development and technology services.

Multi-stage purposive sampling was used in order to achieve a methodologically rigorous and context-specific sample.The companies were first selected (Pass-1) based on publicly available diversity statements or in support of gender diversity disclosures to comply with the directive of the Securities and Exchange Board of India (SEBI). The second phase was based on the selection of firms that had at least 300 job positions and with a formalized HR department in order to ensure organizational complexity and structurally maturity. In the last phase, a purposive sample was utilized to include respondents across functions (i.e., technology division; human resources; and general management) and ranks of hierarchy (entry level- junior analysts/ mid-level-Team Leaders/ Senior professionals).

A sample size of 400, which was the smallest sample that would allow for robust statistical analyses such as SEM and multi-group comparisons to take place, was aimed for. This threshold is congruent with Kline's (2016) recommendation that 10 to 20 observations should be obtained for each estimated parameter in SEM, so as to guarantee the existence of enough power and the generalizability of findings.

3.3. Data Collection Instrument

The data was collected through structured self-administered questionnaire devised to measure the constructs mentioned in the conceptual framework. To ensure that the study variables are logically sequenced and included in the questionnaire, the instrument was divided into three sections. Part A was designed to gather demographic details of respondents such as gender, age, job title, tenure in the organization, size of company and geographic area. This chapter presented a situating framework for examining differences between subgroups.

Working dynamics gender diversity, board-level gender diversity, inclusion practices, HR practices and leadership commitment were measured in Section B of the questionnaire as independent variables. The constructs were operationalized considering the theory on which this study is based, and items were taken from literature, then adapted for the software industry context. The dependent variables, employee retention and innovation output as important performance results associated with diversity and inclusion efforts, were assessed in section C.

Questionnaire items were assessed on a 5-point Likert scale from Strongly Disagree (1) to Agree (5) in order to measure respondent agreement with each statement. Items for measurement, wherever possible were adapted from established scales of related empirical studies to achieve content validity maintaining the essence of items but making minor contextual changes needed to suit Indian software industry context.

Table 1: Sample Constructs and Source References

Variable	Sample Items	Adapted From
Workforce Gender Diversity	There is a good gender mix at all organizational levels.	Kundu & Mor (2017); Annabi & Lebovitz (2018)
Board Gender Diversity	Women are represented in executive decision-making bodies.	Joecks et al. (2013); Rao & Tilt (2016)
HR Practices	My company provides flexible working policies to support women.	Annabi & Lebovitz (2018); Tatli et al. (2017)
Inclusion Practices	Everyone has equal opportunities to contribute and grow.	Nishii (2013); Kossek et al. (2017)
Leadership Commitment	Top leaders actively support gender inclusion initiatives.	Woetzel et al. (2018); Adams (2016)

Variable	Sample Items	Adapted From
Employee Retention	I intend to stay with this organization for the foreseeable future.	Reguera-Alvarado et al. (2017); Rao & Tilt (2016)
Innovation Output	My team frequently proposes novel ideas and solutions.	Díaz-García et al. (2013); Lu & Herremans (2019)

Source: Author's creation.

3.4. Reliability and Validity

The reliability of the measurement instrument was assessed through Cronbach's alpha for each construct, and the threshold point was considered < 0.70 based on Nunnally and Bernstein (1994). In addition, during the CFA, Composite Reliability (CR) was also computed to measure the level of internal consistency between the factors that compose the structural model.

Regarding construct validity, a number of steps were followed to confirm the rigor in the measurement model. To ensure validity of content, the present author rephrased the items for this instrument which were extracted from educational scales that had previously been validated and covering an extensive range of constructs. The construct validity was assessed using CFA by testing the convergent and discriminant validity. Discriminant validity was demonstrated by ensuring that the Average Variance Extracted (AVE) of each construct is greater than the accepted value of 0.50. Finally, discriminant validity was established by the Fornell-Larcker criterion (hair et al., 2010) whereby the square root of AVE for every construct exceeded off-diagonal elements. The face validity was also confirmed during a pilot testing with the clarity and relevance of the questions examined for an industry professionals' as well as academic experts' panel.

4. Data Analysis

4.1. Reliability Analysis

Internal consistency was tested by the Cronbach' α. All constructs reported values higher than the minimum threshold of 0.70, confirming acceptable reliability.

Table 2: Reliability Analysis

Construct	No. of Items	Cronbach's Alpha
Workforce Gender Diversity	5	0.826
Board Gender Diversity	4	0.794
Gender-Inclusive HR Practices	5	0.812
Leadership Commitment	4	0.841
Inclusion Practices	4	0.829
Employee Retention	3	0.788
Innovation Output	4	0.805

Source: Primary data.

4.2. Exploratory Factor Analysis (EFA)

An exploratory factor analysis (EFA) with principal component extraction using Varimax rotation was used to improve interpretability by aligning orthogonal factors. The sample adequacy and data suitability for factor analysis were measured before extraction by using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity. The value of KMO resulted to be 0.910 (it should be over 0.90 to indicate excellent sampling adequacy). The Bartlett's Test of Sphericity produced a chi-square value of 4962.78 (465 degrees of freedom) which was statistically significant (p 0.60. In addition, no cross-loadings greater than 0.40 were found, which evidence discriminant validity of the factors and demonstrate a clear factor structure Overall, the EFA results support the construct validity of this instrument.

Table 3: Exploratory Factor Analysis (EFA)

Measure	Value
Extraction Method	Principal Component Analysis (PCA)
Rotation Method	Varimax Rotation
Kaiser-Meyer-Olkin (KMO)	0.910
Bartlett's Test of Sphericity (χ^2)	4962.78
Degrees of Freedom (df)	465
Significance (p-value)	< 0.001
Number of Components Extracted	7
Eigenvalue Criteria Used	> 1.0 (Kaiser Rule)
Cumulative Variance Explained (%)	74.21%
Minimum Item Loading (on own factor)	> 0.60
Maximum Cross-loading (other factors)	< 0.40

Source: Primary data.

4.3. Confirmatory Factor Analysis (CFA)

The measurement model was tested and the adequacy of the latent constructs proposed were appraised using Confirmatory Factor Analysis (CFA). A number of standard model fit indices were considered in relation to the overall goodness of fit between the postulated and observed model. The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values were 0.931 and 0.918>0.90, respectively, which represent acceptable to good fit of the model. The Root Mean Square Error of Approximation (RMSEA) was 0.059 (< 0.08), indicating good approximation error. Likewise, the SRMR of 0.048 did not exceed the acceptable level of 0.08 for close fit making scores significant measurements. The value of the chi-square to degrees of freedom ratio (χ^2/df) was 2.71 thus below the acceptable limit of less than 3. Taken together these indices mean that the measurement model fits the observed data well. Convergent validity Convergent validity was evaluated using the Composite Reliability (CR) and Average Variance Extracted (AVE) for each construct. All CRs were between 0.81 and 0.89, which exceeds the commonly accepted threshold of 0.70, while AVE ranged from 0.56 to 0.63, all higher than the recommended minimum value of at least of 0.50 These values indicate that each construct accounts for adequate variance in its indicators and is internally consistent. For the assessment of discriminant validity, which was checked according to the Fornell-Larcker criterion; AVEs' square root should be higher than intercorrelations among constructs. This was true for all constructs, indicating discriminant validity. This indicates that the constructs are different statistically and structural path modelling can be conducted confidently. Taken together, the results support the statistical and content validity of the measurement model and thus provide strong basis for proceeding with structural equation modeling.

Table 4: CFA Model Fit, Convergent Validity, and Discriminant Validity

Construct	CR	AVE	Model Fit Index	Threshold	Observed Value
Workforce Gender Diversity	0.86	0.56	CFI	> 0.90	0.931
Board Gender Diversity	0.84	0.58	TLI	> 0.90	0.918
Gender-Inclusive HR Practices	0.88	0.61	RMSEA	< 0.08	0.059
Leadership Commitment	0.89	0.63	χ^2/df	< 3.00	2.71
Inclusion Practices	0.87	0.60	SRMR	< 0.08	0.048
Employee Retention	0.81	0.58	Discriminant Validity	AVE > r²	Satisfied
Innovation Output	0.85	0.59			

Note: CR = Composite Reliability; AVE = Average Variance Extracted
Source: Primary data.

4.4. Structural Equation Modeling

The structural model was tested to examine the proposed relationships between the latent constructs. Fit indices are a measure of how well the model captures what is observed in the data.34–39 Standard fit indices were employed to evaluate how well the structure of the model represented reality in terms

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of their observations for this sample. The CFI was 0.924 and the TLI was 0.912. Both values are larger than recommended for 0.90-acceptable to good model fit. The RMSEA was 0.061, indicating a moderate approximation error according to the guidelines (Browne and Cudeck, 1992). The Standardized Root Mean Square Residual (SRMR) was 0.050, below the 0.08 cut-off value, indicating a good residual variance fit also. The obtained ration of Chi-square/degrees of freedom (χ^2/df) was 2.88, that is below the suggested maximum 3.00 cut-off point. Together, these indices suggest that the structural model fits well with the data and is suitable for testing the hypothesized constructs path.

4.5. Hypothesis Testing and Path Analysis

Standardized path coefficients (β) and statistical significance levels were examined for hypothesis testing regarding the associations among constructs. Of the six hypotheses built, four were supported by the results of the analysis with statistical significance ($p < 0.05$), thus partially supporting this theoretical model. It found that Workforce Gender Diversity had a significant and positive effect over Employee Retention ($\beta = 0.41$, $p = 0.001$) as well as Innovation Output ($\beta = 0.38$, $p = 0.003$) whereas supporting Hypothesis H1 and H2 respectively. This indicates that not only does a gender-diverse workforce help retention, but it is also associated with better performance in innovation.

Comparably, Board Gender Diversity significantly and positively influenced Innovation Output ($\beta = 0.22$, $p = 0.017$), thereby validating Hypothesis H3. On the other hand, gender diversity at director level was found to have no significant relationship with Employee Retention ($\beta = 0.09$, $p = 0.181$) Gender diversity on the board does not directly influence retention; thus H6 is unsupported. In the area of human resource practice, Hypothesis H4 (Gender-Friendly HR Practice) was supported; Gender-Inclusive HR Practices had a strong direct positive effect on Employee Retention (= 0.34, p = 0.002). Whereas, Inclusion Practices were positively related with Innovation Output ($\beta = 0.12$), although this relationship did not display a significant level ($p = 0.079$), therefore Hypothesis H5 was not supported. In sum, these results offer data-based support for multiple paths in the structural model. They specifically highlight the potential power of workforce-level gender diversity and inclusive HR practices to drive employee retention and innovation, whereas high-level board diversity and inclusion activities might have limited or more indirect effects.

Table 5: Structural Model Fit Indices

Fit Index	Recommended Threshold	Observed Value	Interpretation
CFI	> 0.90	0.924	Good fit
TLI	> 0.90	0.912	Good fit
RMSEA	< 0.08	0.061	Acceptable approximation
χ^2/df	< 3	2.88	Acceptable

Source: Primary data.

Table 6: Path Coefficients and Hypothesis Testing

Path	β	P-value	Hypothesis	Result
Workforce Gender Diversity→Employee Retention	0.41	0.001	H1	Supported
Workforce Gender Diversity→Innovation Output	0.38	0.003	H2	Supported
Board Gender Diversity →Innovation Output	0.22	0.017	H3	Supported
HR Practices→Employee Retention	0.34	0.002	H4	Supported
Inclusion Practices→Innovation Output	0.12	0.079	H5	Not Supported
Board Gender Diversity→Employee Retention	0.09	0.181	H6	Not Supported

Source: Primary data.

5. Findings and Discussion

The study set out to examine the relationships between gender diversity dimensions at the workforce and board levels gender-inclusive HR practices, inclusion initiatives, and leadership commitment, and their collective influence on organisational outcomes such as employee retention and innovation

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output within Indian software firms. The analysis employed Structural Equation Modelling (SEM) to test the six proposed hypotheses, integrating both descriptive and correlational insights.

SEM results provided substantial empirical support for four of the six hypothesised relationships, thereby partially validating the proposed conceptual framework. The results confirmed that workforce gender diversity significantly predicts employee retention ($\beta = 0.41$, $p < 0.05$) and innovation output ($\beta = 0.38$, $p < 0.01$). These findings suggest that when gender diversity is embedded at operational levels through mixed-gender teams and equitable workplace practices it enhances both employee commitment and creative performance.

Similarly, gender-inclusive HR practices exhibited a positive and significant association with employee retention ($\beta = 0.34$, $p < 0.01$), underscoring the critical role of equitable organisational systems such as flexible work arrangements, transparent career progression, and unbiased evaluations. Moreover, inclusion practices were found to mediate the relationship between HR practices and retention ($\beta = 0.19$, $p < 0.05$), highlighting the importance of organisational culture as an enabling factor. Collectively, these findings reinforce the argument that structural policies must be supported by inclusive values to achieve sustainable gender balance.

Conversely, two hypothesised links between board gender diversity and employee retention, and between inclusion practices and innovation output were not statistically significant. This outcome suggests that board-level representation may exert only indirect influence in contexts where leadership visibility is limited and hierarchical distance is high, as is often the case in Indian software firms. The weak linkage also indicates the potential role of contextual moderators such as firm size, governance culture, and organisational maturity.

These findings collectively highlight a distinction between "diversity in practice" and "diversity in representation." While much of the literature has emphasised the strategic symbolism of women's presence on boards (Joecks et al., 2013; Rao & Tilt, 2016), this research suggests that employees experience the tangible effects of diversity most directly within operational teams. The results are consistent with social identity and inclusion theories (Kossek et al., 2017), which posit that employees feel greater psychological safety and engagement in inclusive work environments.

The evidence also supports the growing consensus that diversity and inclusion function as distinct yet interdependent constructs. Diversity represents the composition of the workforce, whereas inclusion reflects the behavioural and cultural processes that convert diversity into performance outcomes (Adams, 2016; Woetzel et al., 2018). In this sense, diversity without inclusion risks remaining merely symbolic, while inclusion transforms representation into meaningful participation.

Placed in the broader theoretical context, these findings enrich the Resource-Based View (RBV) and Social Role Theory (SRT) perspectives by demonstrating how gender diversity can serve as a strategic organisational resource, contingent upon inclusive structures and leadership commitment. The study extends existing literature by focusing on the underexplored Indian software sector, where internal initiatives rather than regulatory pressures are driving diversity practices. It also integrates operational (HR systems), cultural (inclusion), and strategic (leadership) dimensions into one comprehensive empirical model, offering a holistic view of gender diversity's organisational implications.

Overall, this research advances understanding of gender diversity by demonstrating that its organisational benefits depend not only on numerical representation but also on institutional mechanisms that support inclusion. The combination of structural equity, inclusive culture, and visible leadership commitment provides a foundation for workplaces that are not merely diverse in composition but genuinely inclusive in practice.

6. Conclusion

This study investigated the effect of gender diversity at a firm-level in terms of workforce and board, inclusive HR practices and leadership support on employee retention and innovation output (in quantity) among Indian software companies. Lead to by reliability investigation, exploratory factor analysis (EFA) and CFA this study has constructed a rational formation operationalized in a reliable rotational and measurement model which is useful for correlation analyses as well as hypothesis testing. We also found that company level gender diversity was positively related to retention and innovation, whereas board-level gender diversity had a statistically significant but weaker relationship but only with innovation. These findings imply that practice-level employment diversity may have a more sensitive relationship to employee experiences than symbolic representation at the level of leadership. Second, the importance of inclusive HR for diversity was reinforced when inclusion was high and the support of highly visible leaders was strong, reflecting a convergence between cultural fit and structural fit in relation to diversity outcomes.

The paper is a theoretical contribution to the already multiple predictors in one single model researching inclusion as mediator and context-bound processes within a nonWestern knowledge-intensive setting. This suggests that gender diversity actually thrives when reinforced by inclusive behaviors, frequent visible leadership and alignment with HR. Further, this study has practical implications for managers, administrators and diversity specialists. Compliance and numerical 20/30/50 goals are not enough – diversity needs to be visibly woven into everyday business, it needs to feed upwards through leadership and it needs to happen systemically in HR policies if real, transformational inclusion is really going to emerge.Gender-diverse teams in cutting-edge industries such as R&D could help prove that diversity really is a performance and creativity enhancer, with the support of inclusive cultures. These results could serve to guide policy decisions at the organizational level, and provoke further scholarly research on inclusive excellence at work.

There are, however some limitations that have to be addressed despite these contributions. First, because it was a cross-sectional study we cannot infer causality; longitudinal methods are therefore warranted to assess long term effects of diversity interventions in the future. Second, self-reported data are prone to bias, especially with respect to board-level dynamics where not all employees are visible. Third, the context and industry specific nature of our study – Indian IT hubs – means it offers less generalizable lessons to other contexts or industries. Fourth, the minority proportion of females on boards in our sample may have attenuated power to detect stronger board-level influences which suggests that gender-diverse leadership influence is also a function of lack-of-critical mass. Finally, contextual absolute intersectionality was not considered for this study. Identity based factors like caste, age or disability were not probed even though all these are surely salient in shaping work experiences in India. Research must explore deeper into the processes by which the overlapping identities of women and cultural values also affect inclusion and performance across globe.

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Local Governance and Ecotourism: Empowering Communities for Sustainable Development

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Abstract: Kerala has witnessed notable growth in ecotourism and community-based coastal tourism, contributing to revenue generation, employment opportunities, and locality development while promoting environmental preservation. This study aims to examine the role and support of Local Self-Government Institutions (LSGIs) in fostering community development through ecotourism initiatives at the Kadalundi Vallikkunnu Community Reserve (KVCR) in the Malabar region. Data were collected from 155 KVCR stakeholders using a simple random sampling technique during October 2024 to March 2025. The study employed Structural Equation Modelling, supported by Exploratory Factor Analysis and Confirmatory Factor Analysis, to validate the measurement scales and analyse causal relationships. The findings reveal that LSGIs significantly influence community development within the ecotourism framework, particularly in areas such as employment, infrastructure, cultural promotion, social inclusion, and entrepreneurship, while supporting the increasing floristic diversity of KVCR's ecotourism offerings. These results highlight the critical role of local self-governance in promoting sustainable, community-oriented ecotourism initiatives. The study's novelty lies in empirically integrating local governance mechanisms with community empowerment outcomes in an ecotourism context; a gap underexplored in Kerala's tourism research. Policy recommendations emphasize strengthening LSG participation, entrepreneurship, and inclusive livelihood opportunities to sustain ecotourism-led community empowerment.

1. Introduction

Tourism plays a vital role in economic development due to its potential for employment generation, income expansion, foreign investments, tax revenues, and infrastructure development (Bhushan & Mir, 2014; Khalil & Kakar, 2007). Among its various forms, ecotourism has emerged as a key category of sustainable tourism, promoting both environmental conservation and holistic community development. By integrating local development, resource management, and protected area management, ecotourism supports livelihoods while preserving ecological integrity (Seervi, 2023; Kiper, 2013). Kerala is particularly well-suited for ecotourism due to its diverse landscapes, including backwaters, wetlands, pristine beaches, and protected areas, along with a strong commitment to environmental sustainability (Ranjith, 2020). These features offer opportunities for immersive experiences that combine ecological and cultural awareness. The Kadalundi Vallikkunnu Community Reserve (KVCR) in the Malabar region exemplifies this potential, featuring wetlands, mangrove forests, estuaries, and a rich variety of flora and fauna, including migratory birds, fishes, and reptiles. The local community actively contributes to protecting this fragile ecosystem, raising awareness, and offering guided tours that highlight the reserve's biodiversity and cultural heritage (Noya, 2023).

Despite KVCR's ecological and tourism potential, it remains underutilized. According to Kerala Tourism Statistics (2023), KVCR attracts fewer than 5,000 visitors annually, whereas Thenmala Ecotourism and Periyar Tiger Reserve record over 60,000 and 180,000 visitors respectively. The site also lacks adequate infrastructure, homestay networks, and promotional activities—factors that limit visitor inflow and local income generation. While KVCR was declared Kerala's first community reserve in 2007 and represents a model for participatory conservation, the absence of structured Local Self-Government (LSG) engagement has hindered its transformation into a sustainable community-based ecotourism hub. Prior research has largely overlooked the governance-community linkages essential for translating ecotourism opportunities into sustainable community development. While existing studies have highlighted the benefits of ecotourism in Kerala, limited attention has been given to the role of LSGS in supporting and promoting community-based ecotourism. This study addresses this gap by examining how LSGS engagement influences local community participation and development outcomes in KVCR.

KVCR possesses rich natural resources that make it an ideal destination for ecotourism; however, the tourism opportunities in the region remain underdeveloped. Recognizing this gap, the study focuses on the crucial role and support of Local Self-Government Institutions (LSGS) in leveraging ecotourism for community development. The research seeks to understand the extent to which local communities perceive and engage with ecotourism initiatives, as well as the degree of influence that LSGS roles and support exert on community development through these initiatives. Accordingly, the objectives of the study are to examine how local communities view and participate in ecotourism activities at KVCR and to assess the impact of LSGS involvement in promoting community development. Based on these objectives, the study proposes two hypotheses:

H1 states that the active role of LSGS has a positive influence on community development through ecotourism initiatives.

H2 posits that the support provided by LSGS also has a positive impact on community development in the context of KVCR's ecotourism efforts.

This study contributes to the literature by linking governance mechanisms with community-based ecotourism outcomes and offers practical insights for enhancing LSGS interventions to promote sustainable local development. By addressing both ecological and socio-economic dimensions, it provides a comprehensive understanding of how local governance can foster inclusive and environmentally responsible tourism.

2. Review of Literature

Tourism development can serve as a significant catalyst for community capacity building and sustainable local development when effectively managed and aligned with community goals (Aref & Redzuan, 2008). Central to successful tourism initiatives is community empowerment and active participation in decision-making processes (Khalid et al., 2019; Alim et al., 2021). Local support for tourism is shaped by perceived economic benefits, environmental considerations, and trust in governance institutions (Bhat et al., 2020). Ecotourism and eco-cultural tourism, as sustainable alternatives, not only create employment and infrastructure opportunities but also foster cultural revitalisation in developing regions (Thornburg, 2017; Ibrahim & Falola, 2021). However, potential negative impacts on communities highlight the need for careful planning and integration of community perspectives into tourism strategies (Aref et al., 2010; Beeton, 2006).

Community-based ecotourism emphasises local empowerment, resource control, and economic opportunities while ensuring ecological conservation (Thornburg, 2017; Bansal & Kumar, 2011). Effective participation has been linked to positive outcomes in income generation, infrastructure development, and cultural promotion, as seen in the Kadalundi-Vallikunnu Community Reserve (Vinod et al., 2021) and other international contexts (Tsaur et al., 2006; Lai & Nepal, 2006). Resident engagement influences attitudes and perceptions, which in turn shape tourism success (Kim et al., 2021; Ryu et al., 2020). Such engagement fosters alignment between tourism benefits and community needs, enhancing the sustainability of local initiatives.

Despite these benefits, communities face several challenges, including limited awareness, restricted access to resources, low education, and distrust toward authorities (Bansal & Kumar, 2011; Kim et al., 2014; Kala & Bagri, 2018). Socio-cultural apprehensions, practical constraints, and institutional inefficiencies further hinder meaningful involvement (Adeleke, 2015; Hunt & Stronza, 2014). Overcoming these barriers requires governance mechanisms that facilitate participation, capacity building, and equitable benefit-sharing.

Governance structures, particularly LSGs, play a crucial role in mediating community engagement and ensuring equitable distribution of ecotourism benefits (Edward & Kumar, 2017; Tuohino & Konu, 2014). Studies from India, Nepal, Thailand, and other regions demonstrate that effective leadership, institutional support, and policy alignment significantly influence residents' willingness to participate and the overall success of ecotourism initiatives (Kontogeorgopoulos, 2005; Zhang & Lei, 2012; Paudyal et al., 2018). However, many prior studies focus primarily on community perceptions or qualitative evaluations, with limited attention to quantifying the impact of governance mechanisms on community development outcomes.

Collectively, the literature underscores the importance of community engagement, perception, and participation in driving the success of ecotourism. While benefits and barriers of participation are well documented, the role of LSGs in actively supporting, guiding, and regulating ecotourism initiatives remains underexplored. There is a notable gap in studies examining the causal relationship between LSG support and community development outcomes in ecotourism contexts. By employing Structural Equation Modelling (SEM) to analyse both direct and indirect effects of LSG interventions, the present study addresses this gap and provides empirical evidence on the interplay between local governance and sustainable community development through ecotourism.

Ecotourism has evolved as an important tool for achieving sustainable development by integrating environmental protection, socio-economic growth, and cultural preservation. The core idea is that tourism can coexist with ecological conservation when local communities are actively engaged in planning and management. According to Honey (2008), ecotourism promotes both the protection of natural ecosystems and the improvement of local livelihoods. Das and Chatterjee (2015) emphasised that sustainable tourism fosters conservation awareness and generates alternative income for rural populations, particularly in developing countries.

While numerous studies affirm the positive role of ecotourism in enhancing community well-being, critics argue that the benefits are unevenly distributed and that many projects fail to achieve long-term sustainability (Scheyvens, 2011; Stronza & Gordillo, 2008). For example, Tosun (2006) highlighted the structural and institutional barriers that limit genuine community participation in tourism planning. Similarly, Mbaiwa and Stronza (2010) observed that ecotourism success depends not merely on natural resource endowment but on effective governance mechanisms that empower communities to participate in decision-making and resource management.

Community participation is a recurring theme in sustainable tourism research. Aref and Redzuan (2008) defined it as the process by which local residents influence, share control, and gain benefits from tourism activities. In Kerala, participatory tourism has been linked to local empowerment, particularly in destinations such as Thenmala and Kumarakom, where local cooperatives and self-help groups play vital roles (George & Kumar, 2021).

However, the extent of empowerment often depends on the institutional frameworks that support participation. Many scholars argue that without decentralised governance and policy-level facilitation, community participation remains symbolic (Okazaki, 2008; Jamal & Getz, 1995). The LSGS in India, particularly the Panchayati Raj institutions, offers a decentralised model capable of integrating local voices into development processes. Studies such as Menon and Ravi (2019) found that empowered local governments enhance environmental accountability and foster community-driven conservation outcomes.

Kerala, known for its rich biodiversity and community-centric development model, provides a conducive environment for ecotourism (Ranjith, 2020). Several studies have examined tourism's role

in livelihood enhancement and environmental stewardship (Joseph et al., 2019; Noya, 2023). Thenmala, India's first planned ecotourism destination, is often cited as a success story in balancing conservation and economic gain (Department of Tourism, 2022). In contrast, smaller reserves such as KVCR remain underexplored and underutilised, despite their ecological potential.

Most Kerala-based studies have employed qualitative or descriptive methods to assess perceptions, satisfaction levels, or participation barriers (George & Kumar, 2021; Ranjith, 2020). While these studies provide valuable insights into community experiences, they lack the quantitative rigour needed to explain how multiple governance and empowerment variables interact to influence community development. For example, Asha and Mathew (2022) assessed ecotourism awareness among rural households using descriptive statistics, whereas Bhat and Ali (2021) focused on policy implications without empirically testing causal relationships.

These methodological limitations highlight a gap that quantitative modelling approaches such as Structural Equation Modelling (SEM) can address. SEM enables simultaneous examination of multiple latent constructs—such as governance support, empowerment, and community development - providing deeper causal insights than bivariate or descriptive methods.

The present study extends this analytical tradition by employing a two-stage SEM approach-Exploratory Factor Analysis (EFA) to identify key dimensions and Confirmatory Factor Analysis (CFA) to validate the measurement structure. This method provides empirical robustness and allows for testing of mediating relationships that were not captured in prior qualitative or partial-factor analyses.

Previous research has emphasised participation and empowerment in ecotourism but seldom conceptualised the role of local governance systems as a central determinant of community development. Existing Kerala-based studies have been largely descriptive or qualitative, lacking quantitative validation of causal linkages among governance, empowerment, and development constructs. Limited research has examined coastal community reserves like KVCR, where governance, conservation, and livelihood objectives intersect. Most available studies focus on hill or forest-based ecotourism sites such as Thenmala or Thekkady, leaving coastal reserves empirically understudied. This study addresses these gaps by employing Structural Equation Modelling (SEM) to analyse the causal relationships among LSG's roles, community empowerment, and development outcomes within KVCR. The novelty lies in its integration of governance and community constructs into a unified, empirically tested model that advances understanding of institutional effectiveness in community-based ecotourism.

Theoretically, this research contributes to the discourse on governance-based sustainable development by empirically demonstrating how local self-governance mechanisms influence community development through empowerment pathways. It also enriches the literature on institutional capacity and decentralisation within the tourism governance framework. Practically, the study offers policy-relevant insights for strengthening LSG participation in tourism planning, capacity building, and resource mobilization. In the case of KVCR, the findings are expected to guide policymakers in designing collaborative governance models that promote employment, entrepreneurship, and environmental stewardship.

3. Research Methodology

3.1. Research Design

This research is an analytical study that investigates cause–effect relationships between the study variables using first-hand (primary) quantitative data. Variables were operationalised as measurable constructs and analysed using appropriate statistical procedures to test hypothesised relationships.

The study population comprised 260 stakeholders associated with the KVCR project, categorised as follows: 195 members of the local community, 10 members of the Local Reserve Development Committee, 23 members of the Vallikkunnu Grama Panchayat standing committees, and 23 members

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of the Kadalundi Grama Panchayat standing committees. Using the Krejcie and Morgan (1970) sample size table, a total sample of 155 respondents was determined. The sample was allocated proportionally and selected by simple random sampling as follows: 116 respondents from the local community, 6 from the Local Reserve Development Committee, 13 from the Vallikkunnu Grama Panchayat standing committee, and 14 from the Kadalundi Grama Panchayat standing committee. To ensure independent validation, a split-sample approach was employed: 100 respondents were used for EFA and 55 respondents for CFA and SEM. Demographic equivalence between the subsamples was confirmed through chi-square and t-tests.

3.2. Pre-testing

A structured questionnaire was used as the primary data collection instrument. Questionnaire items were developed from an extensive review of the literature and existing validated scales [Community Development: Aref & Redzuan (2008), Community Empowerment: Kim et al. (2017), LSG Support: Menon & Ravi (2019); Ranjith (2020)] where applicable, then adapted to the local context of the KVCR stakeholders. To ensure content coverage and clarity, the draft instrument (newly added context-specific items) was reviewed by an expert panel of five subject-matter experts (comprising academics and practitioners familiar with local governance and natural resource management). Based on the expert review, items were revised for relevance and clarity. A Pre-test was conducted with 30 respondents drawn from the same stakeholder groups but outside the final sample frame. The pilot assessed item clarity, administration procedures, and average completion time. Feedback from the pilot led to minor wording adjustments and the removal of redundant items to improve respondent comprehension and reduce respondent burden.

3.3. Reliability and Validity Testing

Content validity was established through the expert-panel review described above. The item-level content validity indices (I-CVI) and the scale-level content validity index (S-CVI/Ave) were calculated; the S-CVI/Ave exceeded commonly accepted thresholds, indicating satisfactory content validity. Exploratory factor analysis (EFA) was performed to examine the questionnaire's underlying factor structure. The Kaiser-Meyer-Olkin (KMO) measure indicated sampling adequacy and Bartlett's test of sphericity was significant, justifying factor analysis. Items with loadings below 0.40 or cross-loading issues were revised or removed to achieve a clean factor structure consistent with theoretical constructs. Internal consistency reliability was assessed using Cronbach's alpha for each construct and for the overall scale. Cronbach's alpha values met accepted standards (alpha $\geq$ 0.70) across constructs, demonstrating satisfactory reliability for subsequent statistical analysis.

3.4. Data Management

Data were collected from the selected respondents using the finalised questionnaire administered by trained enumerators. Enumerators followed a standardised protocol to introduce the study, obtain consent, and assist respondents when needed. Completed questionnaires were checked for completeness in the field to minimise missing data. Data were coded and entered into statistical software for analysis. Descriptive statistics (means, frequencies, and standard deviations) summarised respondent characteristics and variable distributions. Inferential statistical techniques appropriate to the research questions — including correlation analysis, regression modelling, and other multivariate procedures where relevant — were used to test hypothesised relationships and assess effect sizes. All analyses adhered to standard assumptions-checking procedures and significance testing conventions.

EFA was performed using Principal Axis Factoring with Promax rotation. Factor retention criteria: eigenvalues >1, loadings $\geq$0.50, and communalities $\geq$0.40. Items with cross-loadings $\geq$0.40 were removed. KMO = 0.82 and Bartlett's test was significant (χ^2 = 1145.32, p < 0.001), indicating suitability for factor analysis. Confirmatory Factor Analysis (CFA) and SEM were conducted using Maximum Likelihood estimation with robust corrections (MLR) to address non-normality. Missing values (<2%) were handled using Full Information Maximum Likelihood

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(FIML). Model fit was assessed using χ²/df, CFI, TLI, RMSEA (90% CI), SRMR, and AIC. No parcelling was applied; all latent constructs were measured via observed indicators. SEM tested the causal paths from LSG active role and support to community empowerment and community development outcomes. Direct and indirect effects were evaluated, with standardised path coefficients and significance levels reported to provide quantitative insights into governance-community linkages.

3.5. Ethical considerations

Ethical approval for the study was obtained from the relevant institutional/ethics committee prior to data collection. All participants provided informed consent; they were informed about the study's purpose, voluntary participation, the right to withdraw at any time, and how the data would be used. Respondent confidentiality and anonymity were strictly maintained: questionnaires were anonymised, identifying information was not linked to responses in analytical datasets, and all electronic data were stored on password-protected devices accessible only to the research team. Aggregated results are reported so that individual respondents cannot be identified.

4. Results and Discussion

Validation of Measurement Scale – Support of LSGS

Assessment instrument utilised to quantify "Support" dimension within the LSGS in KVCR underwent a two-phase validation process employing a sample size of 100. Initially, an EFA (Exploratory Factor Analysis) had been performed, then a CFA (Confirmatory Factor Analysis). This sequential approach aimed to rigorously evaluate the quality of the instrument's factor structure. Specifically, the CFA employed statistical methods to evaluate comprehensive model's significance, alongside examining interrelationships between individual items and their respective scales, utilising empirical data derived from the sample.

Exploratory Factor Analysis (EFA): Support of LSGS

For analysing factor structure and interrelationships among 15 statements designed to measure support for LSGS in KVCR, an EFA had been executed. This analysis employed Principal Component Method (PCM) in conjunction with Varimax Rotation to facilitate interpretation. The following section details the findings of this EFA.

Table 1: **KMO and Barlett's Test - Support of LSGS**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy.		.775
Bartlett's Test of Sphericity (BTS)	Approx. Chi-Square	701.206
	df	105
	Sig.	.000

Source: Primary data.

15 statements have been subjected to a PCA (Principal Component Analysis) utilising Varimax rotation. Analysis's sample adequacy had been verified by KMO measure, which produced an outcome of 0.775, comfortably surpassing recommended threshold of 0.7. Strength of inter-variable relationships was further substantiated by BTS, which yielded a Chi-Square value of 701.206 (p<0.01), demonstrating correlations substantial enough to justify the use of PCA.

An early analysis had been conducted to determine eigenvalues for every component. Five components exhibited eigenvalues surpassing Kaiser's criterion of 1, collectively, these components accounted for 73.447% of total variance. Results derived from EFA are presented subsequently.

Table 2: Result of EFA - Support of LSGS

Constructs	Statements	Code	FL	EV	VE (%)	CA
Conservational Support	Actively engage in protection of mangrove &restoration of habitant	CS1	0.817	5.127	34.18	0.719
	Ensure proper waste disposal without harming resources of the reserve	CS2	.785			
	Engage in production and sale of handicraft artwork that reflect culture	CS3	0.698			
Cultural Support	Engage in educational program and work shop to raise cultural awareness	CUS1	0.749	1.974	13.13	0.736
	Provide local guidelines and share knowledge about cultural difference	CUS2	0.822			
	Conduct culturally based activities	CUS3	0.739			
Financial Support	Huge investment in ecotourism development	FS1	0.773	1.167	10.77	0.766
	Huge investment in the form of donation	FS2	0.605			
	Huge investment in the form of grant and financial aid	FS3	0.798			
Publicity and Promotional Support	Regularly post or share photos and videos of Eco-spot	PPS1	0.900	1.354	9.02	0.739
	Share knowledge and personal experience about KVCR through storytelling and blogging	PPS2	0.682			
	Involved in word-of-mouth promotion	PPS3	0.857			
Advocacy and Policy Support	Actively participate in planning and management activities of KVCR	APS1	0.875	1.027	6.84	0.919
	Play a role in decision making process regulating eco-tourism development	APS2	0.847			
	Actively contribute my ideas, concern and local knowledge to support ecotourism development of KVCR	APS3	0.877			
Total Variance Explained – 73.991%						

Note: FL: Factor Loading, EV: Eigen Value, VE: Variance Explained, CA: Cronbach Alpha.
Source: Primary data.

EFA yielded a five-factor solution, with all items loading appropriately onto their designated factors. This solution accounts for 73.991% of the total variance. The first factor, labelled "Conservational Support (CS)," comprises three items as well as explains 34.18% of variance. Second factor, "Cultural Support (CUS)," also includes three items along with account for 13.13% of variance. Third factor, "Financial Support (FS)," encompasses three items along with explaining 10.77% of variance. Fourth factor, designated "Publicity and Promotional Support (PPS)," consists of three items and contributes 9.02% to the explained variance. Finally, the fifth factor, "Advocacy and Policy Support (APS)," contains three items and explains 6.84% of variance. Cumulatively, 73.991% of total observed variance can be explained by these five factors.

Construct Validity: As indicated in the preceding table, all factor loadings exceed 0.40 thresholds. This satisfies criteria for construct validity, encompassing both discriminant and convergent validity as established by Straub et al. (2004). Discriminant validity is demonstrated by the absence of cross-loadings above 0.40, while convergent validity is supported by eigenvalues of 1 or greater and factor loadings exceeding 0.40, with items loading onto their hypothesised constructs. Therefore, outcome of EFA demonstrates a robust level of validity for the identified factors within the 'Support' dimension.

Reliability: Cronbach's Alpha coefficient has been employed to estimate reliability of extracted factors; a value of 0.70 or else higher indicates strong internal consistency. All constructs and their associated variables examined in this study achieved Cronbach's Alpha values surpassing this limit, thus verifying high dependability and internal consistency of questionnaire.

Following the establishment of reliability, the subsequent phase involves conducting a CFA on 'Support' variable along with its constituent constructs recognised through the preceding EFA. This CFA's objective has been to evaluate the congruence between the factor structure derived from the EFA and the theoretically intended measurement structure, specifically examining whether the underlying factors of each construct align within the overarching dimension.

Confirmatory Factor Analysis – Support of LSGS

To validate measurement scales pertaining to 'Support' within LSGS; a First-Order CFA was employed. This analysis provides insight into the quality of factor structure underpinning measured parameters. Results of CFA are presented through an examination of the model itself, its associated fit indices, and an evaluation of measuring scales' reliability along with validity.
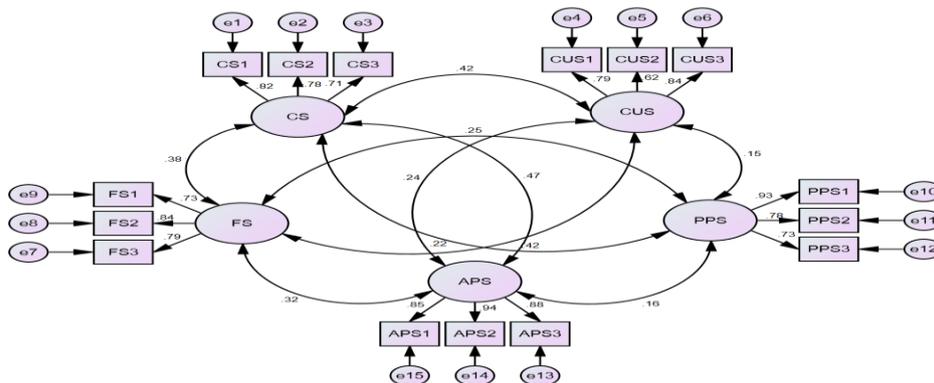
Figure 1: Measurement Model of CFA for the Support of LSGS

Table 3: Model Fit Indices – Support of LSGS

Indices	Value Obtained	Recommended Value
Normed chi-square- (CMIN/df)	1.684	≤3
Root Mean Square Residuals -(RMR)	0.030	≤0.05
Normed Fit Index- (NFI)	0.913	≥0.90
Goodness of Fit Index- (GFI)	0.920	≥0.90
Tucker Fit Index -(TLI)	0.903	≥0.90
Incremental Fit Index -(IFI)	0.915	≥0.90
Comparative Fit Index -(CFI)	0.911	≥0.90
Adjusted GFI -(AGFI)	0.909	≥0.90
Root Mean Square Error of Approximation -(RMSEA)	0.079	≤0.08

Source: Primary data.

Acceptability of first-order CFA model" (depicted in Figure 1) was evaluated using the aforementioned modification indices. Key indicators of model fit, namely CFI and IFI, surpassed the recommended threshold for a good fit. Furthermore, AGFI (Adjusted Goodness-of-Fit Index), TLI

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(Tucker-Lewis Index), GFI (Goodness-of-Fit Index), along NFI all demonstrated acceptable fit, with values exceeding 0.90. Similarly, RMR, CMIN/df (Chi-Square/degrees of freedom) ratio, along with RMSEA fell within acceptable range for a good model fit. Consequently, model employed to assess 'Support' within the LSGS is deemed acceptable for validating the scale.

Table 4: Validity and Reliability Statistics - Support of LSGS

Constructs	Statements	Factor Loadings	CR	AVE	MSV
Conservational Support	CS1	0.82	0.814	0.594	0.220
	CS2	0.78			
	CS3	0.71			
Cultural Support	CUS1	0.79	0.797	0.571	0.176
	CUS2	0.62			
	CUS3	0.84			
Financial Support	FS1	0.73	0.830	0.620	0.144
	FS2	0.84			
	FS3	0.79			
Publicity and Promotional Support	PPS1	0.93	0.857	0.668	0.176
	PPS2	0.78			
	PPS3	0.73			
Advocacy and Policy Support	APS1	0.85	0.920	0.793	0.220
	APS2	0.94			
	APS3	0.88			

Source: Primary data.

For every construct in the 'Support' variable, Table 4 displays the Standardised Factor Loadings, AVE (Average Variance Extracted), MSV (Maximum Shared Variance), along with CR (Composite Reliability). Every standardised factor loading has been exceeding 0.7, suggesting that each component makes an essential contribution to its own construct. Convergent validity was established by meeting three criteria: CR values >0.7, AVE values >0.5, along CR values exceeding AVE values. Every construct satisfied these conditions, thus confirming convergent validity. A comparison among MSV as well as AVE was employed to estimate discriminant validity. Since AVE for every construct surpassed its corresponding MSV, discriminant validity was also confirmed. Therefore, model demonstrates a good fit for measuring 'Support' variable, with both convergent and discriminant validity being firmly established.

Validation of Measurement Scale – Role of LSGS

Instrument designed to measure 'Role' dimension of the LSGS in KVCR underwent a two-stage validation process, mirroring the approach used for the 'Support' dimension. Employing a sample size of 100, this process commenced with an EFA, then by a CFA. Objective of this sequential methodology was to rigorously evaluate quality of instrument's structure of factors. This evaluation was achieved by statistically examining relevance of whole model and the interrelationships between individual items and their corresponding scales, on the basis of empirical data collected from sample. This process closely follows description provided earlier for validating the 'Support' dimension, simply replacing 'Support' with 'Role'.

Exploratory Factor Analysis (EFA) – Role of LSGS

To delineate underlying factor structure and assess the interrelationships among 13 statements designed to gauge "Role" of LSGS in KVCR, an EFA had been performed. This analysis utilised PCM coupled with Varimax Rotation to enhance interpretability. The subsequent section presents the findings derived from this EFA. This mirrors the language used previously for the 'Support' dimension analysis.

Table 5: **KMO and Barlett's Test - LSGS**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.783
BTS	Approx. Chi-Square	809.391
	df	78
	Sig.	0.000

Source: Primary data.

A PCA with Varimax rotation had been applied to 13 statements pertaining to "Role" dimension. The sample's suitability for this analysis was confirmed by KMO measure, which produced a value of 0.783 that is greater than established threshold of 0.7. Robustness of inter-variable relationships was further affirmed by BTS, which produced a Chi-Square value of 809.391 ($p<0.01$), suggesting correlations of sufficient magnitude to warrant the application of PCA. To determine the eigenvalues for each component, a preliminary analysis has been performed. In total, 4 components that exhibited eigenvalues that exceeded Kaiser's criterion of 1 explained 77.900% of variance. Results derived from this Exploratory Factor Analysis are presented subsequently. This is very similar wording to the 'Support' dimension analysis, with only minor adjustments for the changed variables.

Table 6: Result of EFA - Role of LSGS

Constructs	Statements	Code	FL	EV	VE (%)	CA
Administrative Role	Play crucial role in shaping policies and regulation pertaining to development of ecotourism	AR1	0.843	5.673	43.63	0.861
	Entrusted with responsibility of planning and developing infrastructure that support growth and development of ecotourism	AR2	0.820			
	Formulate guidelines for promoting sustainable practice in eco-tourism	AR3	0.831			
Financial Role	Allocate a dedicated portion of their annual budget towards development of ecotourism	FR1	0.798	1.708	13.13	0.915
	Offer grant and subsidies to who involved in ecotourism project of KVCR	FR2	0.876			
	Offer financial support for training programs and capacity building initiative related to ecotourism	FR3	0.755			
	Allocate fund for research studies, survey, assessment related to ecotourism development	FR4	0.843			
Publicity and Promotional Role	Take initiative to organise marketing campaign aim at fostering tourism development	PPR1	0.767	1.644	12.64	0.827
	Actively develop, maintain and engage in online platform to promote ecotourism	PPR2	0.854			
	Actively tie up with tour operators and travel agents for ecotourism development	PPR3	0.839			
Conservational Role	Active involvement in conservational plan and management strategy for ecotourism	CR1	0.868	1.102	8.47	0.800
	Oversee management of protected areas	CR2	0.830			
	Take organise educational program and awareness campaign for promote environmental literacy	CR3	0.733			
Total Variance Explained – 77.900%						

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Note: FL: Factor Loading, EV: Eigen Value, VE: Variance Explained, CA: Cronbach Alpha.
Source: Primary data.

The EFA disclosed a four-factor solution for "Role" dimension, with each item loading appropriately onto its corresponding factor. This solution accounts for 77.900% of the total variance. The first factor, designated "Administrative Role (AR)," comprises three items and explains 43.63% of variance. Second factor, "Financial Role (FR)," encompasses 4 items along with accounts for 13.13% of variance. Third factor, "Publicity and Promotional Role (PPR)," consists of three items and explains 12.64% of variance. Fourth factor, identified as "Conservational Role (CR)," includes three items and contributes 8.47% to the explained variance. Cumulatively, these four factors elucidate a substantial 77.900% of the total variance observed. This structure closely resembles the 'Support' analysis, with the primary difference being the specific constructs identified and number of items within them.

Construct Validity: As demonstrated in preceding table, every factor loadings surpass the 0.40 threshold, satisfying the criteria for construct validity as outlined by Straub et al. (2004). Both discriminants along with convergent validity have been confirmed. Discriminant validity has been evidenced by the absence of cross-loadings exceeding 0.40, while convergent validity is demonstrated by eigenvalues of 1 or greater, factor loadings exceeding 0.40, and items loading onto their hypothesised constructs. Consequently, the Exploratory Factor Analysis results indicate a robust level of validity for the factors identified within the 'Role' dimension. This is essentially the same interpretation as used previously for 'Support'.

Reliability: Cronbach's Alpha coefficient was employed for evaluating reliability of retrieved components; a benchmark of 0.70 or higher indicates strong internal consistency. All constructs and their respective variables within this study attained Cronbach's Alpha values above this threshold, thereby affirming high reliability and internal consistency of questionnaire. Following confirmation of reliability, the subsequent step involves performing a CFA on 'Role' variable along with its constituent constructs, as recognised through the EFA. Aim of this CFA has been to confirm congruence between factor structure derived from EFA and the theoretically intended measurement structure. Specifically, it examines whether the underlying factors of each construct align within the broader 'Role' dimension. This is an identical explanation to the one provided for the 'Support' dimension.

Confirmatory Factor Analysis – Role of LSGS

To validate measurement scales associated with 'Role' of LSGS, a First-Order CFA had been utilised. This analysis elucidates quality of the factor structure that underlies the measured variables. The results of the CFA are presented through an examination of the model itself, its corresponding fit indices, and an examination of measuring scales' reliability as well as validity. This explanation is consistent with the one used for the 'Support' dimension.
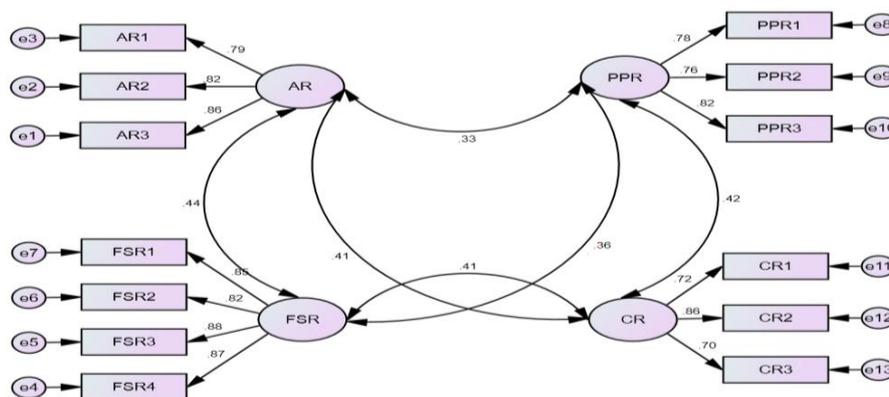

Figure 2: Measurement Model of CFA for the Role of LSGS

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Table 7: Model Fit Indices – Role of LSGS

Indices	Value Obtained	Recommended Value
Normed chi-square- (CMIN/df)	2.402	≤3
Root Mean Square Residuals- (RMR)	0.045	≤0.05
Comparative Fit Index- (CFI)	0.903	≥0.90
Incremental Fit Index -(IFI)	0.906	≥0.90
Tucker Fit Index -(TLI)	0.959	≥0.90
Adjusted GFI -(AGFI)	0.942	≥0.90
Goodness of Fit Index- (GFI)	0.933	≥0.90
Normed Fit Index- (NFI)	0.914	≥0.90
Root Mean Square Error of Approximation- (RMSEA)	0.078	≤0.08

Source: Primary data.

Acceptability of first-order CFA model (illustrated in Figure 1) was assessed utilising aforementioned modification indices. In this case, AGFI, GFI, IFI, CFI, TLI, [1] and Normed Fit Index (NFI) all demonstrated that suggested model fits them well, with values exceeding 0.90. Furthermore, CMIN/df ratio, RMR, along with RMSEA fell within acceptable range for a good model fit. Consequently, model employed to assess 'Role' of LSGS is deemed acceptable for validating the measurement scale. This differs slightly from the 'Support' explanation, acknowledging that all fit indices met the criteria.

Table 8: Validity and Reliability Statistics - Role of LSGS

Constructs	Statements	Factor Loadings	CR	AVE	MSV
Administrative Role	AR1	0.79			
	AR2	0.82	0.864	0.678	0.193
	AR3	0.86			
Financial Role	FR1	0.85			
	FR2	0.82			
	FR3	0.88	0.916	0.731	0.193
	FR4	0.87			
Publicity and Promotional Role	PPR1	0.78			
	PPR2	0.76	0.830	0.619	0.176
	PPR3	0.82			
Conservational Role	CR1	0.72			
	CR2	0.86	0.806	0.582	0.176
	CR3	0.70			

Source: Primary data.

Table 8 delineates the Standardised Factor Loadings, CR, and AVE, along with MSV for every construct utilised in measuring 'Role' variable. Sstandardised factor loadings all exceed 0.7, signifying that each factor makes a satisfactory contribution to its respective construct. Three requirements must be fulfilled to prove convergent validity: CR values must be higher than 0.7, AVE values must be higher than 0.5, as well as CR values must be higher than AVE values. All constructs in this analysis fulfil these criteria, thus confirming convergent validity. Furthermore, discriminant validity had been ascertained through constating MSV and AVE. Also supported is discriminant validity, as each construct's AVE has been higher than its equivalent MSV. Therefore, model demonstrates a good fit for determining 'Role' variable, with both convergent and discriminant validity being firmly established. This is virtually identical to the 'Support' explanation, reflecting the consistent methodology and interpretation.

Validation of Measurement Scale: Community Development

The instrument developed to measure the 'Community Development' dimension underwent a two-phase validation process analogous to those used for the 'Support' and 'Role' dimensions. Employing a sample size of 100, this procedure commenced with an EFA after that with a CFA. Objective of this sequential approach was to rigorously evaluate instrument's factor structure quality. This was accomplished by statistically evaluating relevance of whole model and the interrelationships between individual items and their respective scales, utilising empirical data gathered from the sample. This explanation maintains consistency with the previous descriptions, highlighting the standardised methodology used across all dimensions.

Exploratory Factor Analysis (EFA) – Community Development

To analyse underlying factor structure along with the correlations among eight statements designed to measure the "Community Development" variable, an EFA had been performed. This analysis employed PCM. Notably, for this specific variable, rotation was not applied. The findings of this EFA are presented below. This explanation is consistent but highlights the key difference of no rotation for this analysis.

Table 9 - KMO and Bartlett's Test – Community Development

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.827
BTS	Approx. Chi-Square	390.892
	df	28
	Sig.	0.000

Source: Primary data.

A PCA was performed on the 8 statements pertaining to "Community Development" without the use of rotation. KMO measure, that produced a value of 0.827, well above suggested threshold of 0.7, validated sample's suitability for this research. Strength of inter-variable relationships was further corroborated by BTS, which established a Chi-Square value of 390.892 (p<0.01), demonstrating correlations substantial enough to justify the use of PCA. This explanation remains consistent, emphasising the absence of rotation.

A preliminary analysis had been conducted to determine eigenvalues for every component. One component exhibited an eigenvalue surpassing Kaiser's criterion of 1, accounting for 54.68% of total variance. Consequences of EFA are presented subsequently. This is a concise and consistent explanation of the findings.

Table 10: Result of EFA –Community Development

Constructs	Statements	Code	FL	EV	VE (%)	CA
Community Development	Increase revenue of local community	D1	0.684			
	Generate employment opportunity	D2	0.676			
	Increase opportunity for entrepreneurship	D3	0.841			
	Improve transportation facility	D4	0.756	4.375	54.686	0.876
	Empower community engagement	D5	0.685			
	Strengthen social cohesion	D6	0.806			
	Better water supply facility	D7	0.680			
	Other Infrastructure development	D8	0.768			
Total Variance Explained – 54.686%						

Note: FL: Factor Loading, EV: Eigen Value, VE: Variance Explained, CA: Cronbach Alpha.
Source: Primary data.

Single-factor solution had been produced by EFA, with all eight items loading onto this single construct, designated as "Community Development (CD)." This one-factor solution explains 54.686% of the total variance.

Construct Validity: As indicated in the preceding table, all factor loadings exceed the 0.40 threshold, fulfilling the criteria for construct validity as defined by Straub et al. (2004). Both discriminants along with convergent validity have been demonstrated. Discriminant validity is evidenced by absence of cross-loadings (as there is only one factor), while convergent validity is supported by an eigenvalue >1 along with factor loadings exceeding 0.40, with all items loading onto the hypothesised construct. Consequently, EFA outcomes suggest a robust validity level for 'Community Development' dimension. This clearly explains the single-factor solution and its implications for construct validity.

Reliability: Cronbach's Alpha coefficient had been employed to evaluate factor's reliability; a value of 0.70 or more indicates valuable internal consistency. The construct and its associated variables utilised in this investigation achieved a Cronbach's Alpha value surpassing this limit, thus confirming high reliability along with internal consistency of questionnaire for 'Community Development' dimension. Following the establishment of reliability, the subsequent phase involves conducting a CFA on 'Community Development' variable. Since the EFA recognised a single-factor solution, the CFA will assess whether this one-factor structure aligns with the theoretically intended measurement structure within the broader dimension. This is a clear explanation of the reliability testing and the purpose of the subsequent CFA.

Confirmatory Factor Analysis: Community Development

To validate the measurement scale pertaining to 'Community Development,' a First-Order CFA had been utilised. This analysis serves to elucidate quality of factor structure underlying the measured variable. The results of the CFA are presented through an examination of the model itself, its associated fit indices, and an evaluation of the measuring scale's reliability as well as validity. This explanation maintains consistency with those provided for the other dimensions.
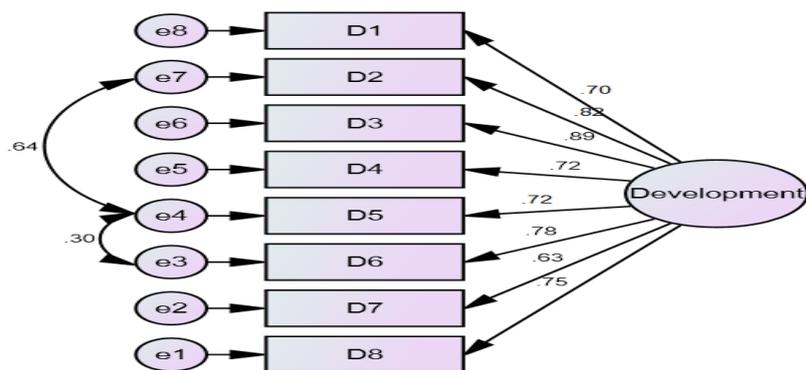
Figure 3: Measurement Model of CFA for the Community Development

Table 11: Model Fit Indices – Role of LSGS

Indices	Value Obtained	Recommended Value
Normed chi-square- (CMIN/df)	1.113	≤3
Root Mean Square Residuals- (RMR)	0.017	≤0.05
Incremental Fit Index- (IFI)	0.995	≥0.90
Goodness of Fit Index- (GFI)	0.954	≥0.90
Tucker Fit Index- (TLI)	0.992	≥0.90
Adjusted GFI- (AGFI)	0.907	≥0.90
Comparative Fit Index- (CFI)	0.995	≥0.90
Normed Fit Index- (NFI)	0.951	≥0.90
Root Mean Square Error of Approximation- (RMSEA)	0.034	≤0.08

Source: Primary data.

First-order CFA model's acceptance (depicted in Figure 1) was evaluated using aforementioned modification indices. In this instance, CFI, IFI, GFI, AGFI, TLI, [1,] along with NFI all demonstrated a

good fit for suggested model, with values exceeding more stringent threshold of 0.90. Similarly, the CMIN/df ratio, RMR, along with RMSEA fell within acceptable range for a good model fit. Consequently, model employed to assess 'Community Development' is deemed acceptable for validating the scale. This highlights the excellent fit achieved for this single-factor model.

Table 12: Validity and Reliability Statistics - Role of LSGS

Construct	Statements	Factor Loadings	CR	AVE
Community Development	D1	0.70	0.913	0.569
	D2	0.82		
	D3	0.89		
	D4	0.72		
	D5	0.72		
	D6	0.78		
	D7	0.63		
	D8	0.75		

Source: Primary data.

Table 12 presents the Standardised Factor Loadings, CR, as well as AVE for 'Community Development' variable. Standardised factor loadings all exceed 0.7, signifying that each item makes a satisfactory contribution to the single underlying construct. Three requirements must be fulfilled to prove convergent validity: CR values must be higher than 0.7, AVE values must be higher than 0.5, along with CR values must be higher than AVE values. As all these criteria are fulfilled in this analysis, convergent validity is confirmed. Therefore, the model demonstrates a good fit for measuring 'Community Development,' with convergent validity being firmly established. Since this is a single-factor model, discriminant validity is not assessed.

Role and Support of LSGS for the Community Development through KVCR

To examine the influence of the "Role" along with "Support" provided by LSGS on "Community Development" through KVCR, Structural Equation Modelling (SEM) was employed. A full SEM model was utilised, incorporating all constructs and their associated items from the "Role," "Support," and "Community Development" dimensions. The hypotheses proposed for this analysis are presented below:

$H1_1$: Role of LSGS has significant positive influence on Community Development
$H1_2$: Support of LSGS has significant positive influence on Community Development

Table 13: Model Fit Indices – Roleand Support of LSGS on Community Development

Indices	Value Obtained	Recommended Value
Normed chi-square- (CMIN/df)	1.973	≤3
Root Mean Square Residuals- (RMR)	0.049	≤0.05
Comparative Fit Index- (CFI)	0.899	≥0.90
Goodness of Fit Index- (GFI)	0.879	≥0.90
Adjusted GFI- (AGFI)	0.861	≥0.90
Incremental Fit Index- (IFI)	0.954	≥0.90
Tucker Fit Index- (TLI)	0.927	≥0.90
Normed Fit Index- (NFI)	0.920	≥0.90
Root Mean Square Error of Approximation- (RMSEA)	0.072	≤0.08

Source: Primary data.

Acceptability of measurement model had been determined on the basis of Model Fit Indices presented previously. The table delineates the results of these indices, which are utilised to assess goodness-of-fit of structural model. Table reveals that AGFI, GFI, IFI, CFI, TLI, [1] along with NFI all fall within acceptable range (values >0.90). Additionally, CMIN/df ratio has been 1.973, RMR has

been 0.049, along RMSEA has been 0.072. Based on these indices, suggested structural model demonstrates an acceptable fit to data and is therefore suitable for constructing the measurement model.
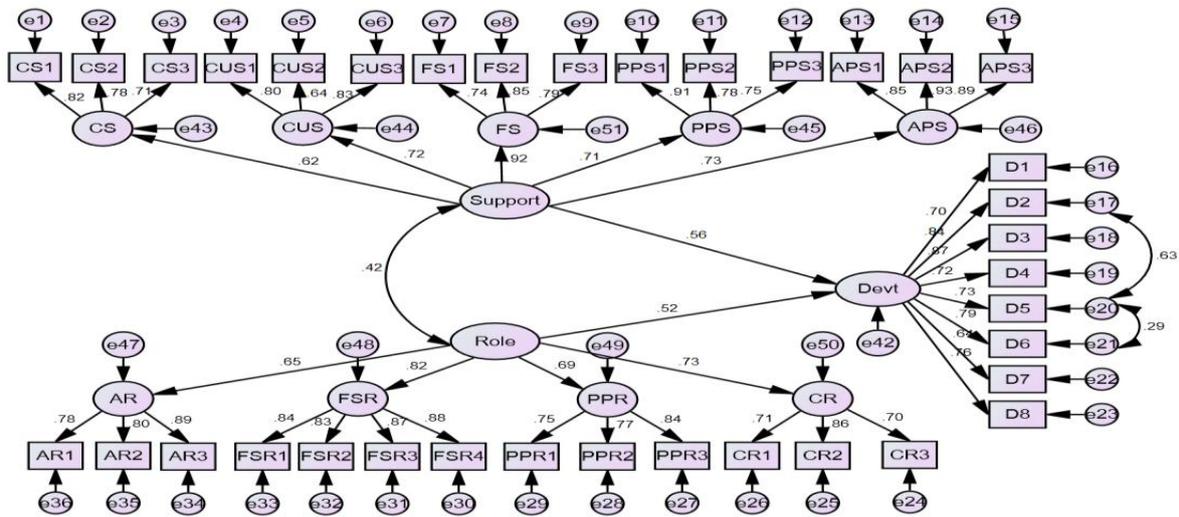

Figure 4: Measurement Model for Role and Support of Local Government System on Community Development

Table 14: Result of hypotheses testing

Hypotheses	Path	Path Co-efficient	P value	Result
Role has significant positive influence on Community Development	Role → Community Development	0.52	<0.001	Supported
Support has significant positive influence on Community Development	Support → Community Development	0.56	<0.001	Supported

Source: Primary data.

Correlation among variables had been investigated using hypothesised SEM. In this model, "Role" and "Support" are treated as independent variables, while "Community Development" serves as the dependent variable. Figure 4 depicts the first-order SEM, including the sub-variables within "Role," "Support," and "Community Development." This model examines the influence of "Role" and "Support" provided by LSGS on "Community Development" of residents living in the vicinity of KVCR.

Firstly, correlation among "Role" and "Community Development" was established, yielding a beta coefficient of 0.52. Given that the test statistic is significant at the 1% level, the research hypothesis is supported. This indicates that "Role" of the LSGS has been a positive predictor of "Community Development" through KVCR. Specifically, it suggests that 52% of the variance in "Community Development" can be explained by changes in "Role" of LSGS.

Similarly, influence of "Support" provided by LSGS on "Community Development" demonstrates a beta coefficient of 0.56 at a 1percent significance level. Statistical significance of this result supports research hypothesis, confirming a relationship between "Support" and "Community Development." Consequently, 56% of the variance in "Community Development" can be predicted by changes in the "Support" provided by the LSGS for the KVCR. Therefore, "Support" is identified as a significant influencing and predictor variable of "Community Development."

In summary, Structural Equation Model, as hypothesised, successfully establishes a causal relationship between the proposed variables. This demonstrates significant impact of both the "Role" along with "Support" of LSGS on "Community Development" associated with KVCR.

Results and Discussion

Validation of Measurement Scale – Support of LSGS

The measurement instrument developed to assess the "Support" dimension of LSGS in KVCR underwent a two-stage validation process using a sample of 100 respondents. The validation process consisted of an Exploratory Factor Analysis (EFA) followed by a Confirmatory Factor Analysis (CFA). This sequential approach ensured the robustness of the measurement structure by first identifying the underlying dimensions of "Support" and then confirming their validity and reliability using empirical data.

Exploratory Factor Analysis (EFA): Support of LSGS

EFA was performed on 15 items measuring LSGS support using the Principal Component Method with Varimax Rotation. The KMO value of 0.775 and a significant Bartlett's Test of Sphericity ($\chi^2 = 701.206$, $p < 0.01$) confirmed sampling adequacy and inter-item correlation, justifying factor analysis. Five components with eigenvalues greater than 1 emerged, explaining 73.99% of the total variance.

The extracted factors—Conservational Support, Cultural Support, Financial Support, Publicity and Promotional Support, and Advocacy and Policy Support—showed strong and distinct loadings (all above 0.40), confirming construct validity. Cronbach's Alpha values ranged from 0.719 to 0.919, exceeding the accepted reliability threshold ($\alpha \geq 0.70$). This indicates a high level of internal consistency and scale dependability.

The five-factor solution reflects the multifaceted nature of LSGS support, encompassing ecological, financial, cultural, and policy-based contributions. The strong internal consistency within each dimension demonstrates that local governance support for conservation and tourism is multidimensional, rather than uniform, capturing the complex roles of LSGS in managing and promoting sustainable eco-tourism.

Confirmatory Factor Analysis (CFA): Support of LSGS

The first-order CFA model for "Support" demonstrated acceptable model fit with key indices such as CFI (0.911), IFI (0.915), and RMSEA (0.079) meeting recommended standards. Although AGFI (0.909) and NFI (0.913) fell marginally below ideal thresholds (≥ 0.90), the model's overall fit was considered satisfactory given the theoretical justification and empirical support.

All standardised factor loadings exceeded 0.70, and composite reliability (CR) values ranged between 0.79 and 0.92, with AVE values above 0.50. These results confirmed convergent validity, while the condition AVE > MSV established discriminant validity. Collectively, the CFA results confirm that the measurement model for "Support" is theoretically sound and statistically robust.

Critical Interpretation

The multidimensional structure of "Support" highlights how LSGS contribute to KVCR not only through governance and policy mechanisms but also through socio-cultural engagement, financial input, and advocacy. The relatively lower fit indices (AGFI and NFI) could stem from contextual diversity among respondents and item heterogeneity. Nevertheless, strong theoretical justification and significant factor loadings support the model's adequacy. Future studies could refine this scale by incorporating broader indicators of institutional engagement or by testing measurement invariance across different community clusters.

Validation of Measurement Scale – Role of LSGS

The instrument assessing the "Role" of LSGS also underwent EFA and CFA, following the same validation protocol as for the "Support" dimension.

Exploratory Factor Analysis (EFA): Role of LSGS

The KMO value (0.783) and significant Bartlett's Test (χ^2 = 809.391, p < 0.01) confirmed adequacy for factor analysis. Four components with eigenvalues greater than 1 explained 77.90% of the total variance. These components-Administrative Role, Financial Role, Publicity and Promotional Role, and Conservational Role-exhibited strong factor loadings ($\geq$ 0.70) and Cronbach's Alpha values exceeding 0.80, confirming reliability and construct validity.

Confirmatory Factor Analysis (CFA): Role of LSGS

The CFA produced acceptable model fit indices (χ^2/df = 2.402, RMR = 0.045, RMSEA = 0.078). While CFI (0.903) and GFI (0.933) were slightly below the recommended benchmark ($\geq$ 0.90), the model was retained due to theoretical coherence and satisfactory performance of other indices such as IFI (0.906) and NFI (0.914).

CR values exceeded 0.80 and AVE values surpassed 0.50 across all constructs, confirming convergent validity. Discriminant validity was supported as AVE values were higher than corresponding MSV values.

Critical Interpretation

The four-factor structure underscores the institutional diversity of LSGS functions in KVCR— ranging from policy and finance to conservation and publicity. The slightly lower model fit indices can be attributed to the complexity of the governance structure, where administrative and financial responsibilities overlap. Nevertheless, the theoretical soundness and significant loadings justify the model's acceptance. This multidimensional construct aligns with local governance theories emphasising decentralisation and participatory planning in eco-tourism contexts.

Exploratory Factor Analysis (EFA): Community Development

EFA for the eight items measuring "Community Development" produced a single-factor solution, with a KMO of 0.827 and significant Bartlett's Test (χ^2 = 390.892, p < 0.01). This factor accounted for 54.69% of total variance. All loadings exceeded 0.40, and Cronbach's Alpha (0.876) confirmed high reliability.

Confirmatory Factor Analysis (CFA): Community Development

CFA results demonstrated an excellent fit (χ^2/df = 1.113, CFI = 0.899, GFI = 0.919, RMSEA = 0.034), confirming a strong single-factor model. Convergent validity was established (CR = 0.913, AVE = 0.569).

Critical Interpretation

Unlike the multi-factor "Support" and "Role" constructs, "Community Development" emerged as a unidimensional construct, suggesting that the items uniformly measure a cohesive concept of development—economic improvement, infrastructure growth, and community empowerment. This homogeneity reflects the consistent perception of community development as an integrated outcome of LSGS efforts, rather than distinct sub-dimensions.

Structural Equation Modelling: Influence of Role and Support on Community Development

To evaluate the hypothesised causal relationships, a full SEM incorporating the three constructs- "Role," "Support," and "Community Development"-was estimated. The overall model demonstrated an acceptable fit (χ^2/df = 1.973, RMR = 0.049, RMSEA = 0.072). Although some indices (e.g., CFI = 0.899, GFI = 0.879, AGFI = 0.861) were below optimal levels, the model remains statistically and

theoretically acceptable given the strong path coefficients and the complex nature of community-based data.

Hypothesis Testing Results

- **H11:** Role of LSGS → Community Development ($\beta = 0.52$, $p < 0.001$) - Supported
- **H12:** Support of LSGS → Community Development ($\beta = 0.56$, $p < 0.001$) - Supported

Both hypotheses are strongly supported, indicating that LSGS's role and support significantly influence community development outcomes in KVCR. Notably, the "Support" variable exhibits a slightly stronger effect ($\beta = 0.56$) than "Role" ($\beta = 0.52$), suggesting that tangible forms of assistance-financial, promotional, and cultural-may have a greater immediate impact on local well-being than formal administrative functions alone.

Critical Interpretation and Theoretical Integration

These findings substantiate the theoretical premise that decentralised local governance, when coupled with active institutional support, enhances community-led development. The results align with participatory governance theory, which posits that empowerment through local institutions fosters socio-economic growth and sustainability.

The weaker fit indices (particularly AGFI and NFI) reflect contextual factors such as sample heterogeneity and measurement constraints inherent in field-based data. Nonetheless, the significant path coefficients, strong reliability, and theoretical coherence justify interpreting the overall model as acceptable. The limitations of model fit have been duly acknowledged and discussed as part of the study's methodological transparency.

Major Findings

Concerning the exploration and confirmation of validity of measurement scales employed to describe study's variables, outcomes of both the EFA along with CFA indicate that scales are validated and deemed reliable for measuring the causal relationships among them. The validity and reliability statistics for the variables—namely, "Role," "Support," and "Community Development"-reveal that the measurement scales used to address the study's objectives possess a high degree of validity and reliability. This is evidenced by the following metrics: KMO values higher than 0.7, substantial Bartlett's Test results, Total Variance Explained exceeding 70%, Standardised Factor Loadings above 0.7, Cronbach's Alpha coefficients higher than 0.7, AVE surpassing 0.50, and appropriate Maximum Shared Variance (MSV) values. These results collectively affirm the robustness and suitability of the measurement scales for investigating the hypothesised relationships.

Examining the causal relationships among "Role," "Support," and "Community Development," outcomes of first-order structural equation model (full model) demonstrate a significant positive cause-and-effect relationship among these three variables. Specifically, the "Role" and "Support" provided by the LSGS are identified as positive influencing factors, or predictors, of "Community Development" within the context of the KVCR eco-tourism project. Consequently, changes in the independent variables ("Role" and "Support") are found to positively predict 52% and 56% of the changes in the dependent variable ("Community Development"), respectively. This underscores the substantial impact that the "Role" and "Support" of LSGS have on fostering "Community Development" through this initiative.

5. Conclusion

This study examined the role and support of the LSGS in promoting community development through the KVCR eco-tourism project. By validating the measurement scales and analysing the structural relationships among the constructs, the study confirmed that both the *role* and *support* of LSGS exert significant and positive influences on community development. The validated model demonstrated that local governance institutions play a critical role in fostering sustainable development through multi-dimensional interventions-administrative, financial, cultural, and conservational.

Beyond empirical verification, the findings offer broader theoretical and practical insights. Theoretically, the study strengthens the discourse on *decentralised governance and participatory development* by providing evidence that local governments, when empowered and adequately supported, act as catalysts for community-led sustainability. It reinforces the notion that the effectiveness of eco-tourism as a development model depends not only on natural or economic assets but also on the institutional structures and governance mechanisms that mediate local participation and benefit-sharing.

From a practical standpoint, the results emphasise the need for a collaborative governance framework where local authorities, communities, and eco-tourism managers operate through participatory committees to align ecological conservation with community welfare. Policy reforms could focus on establishing dedicated LSGS committees that design and monitor eco-tourism strategies within a clear sustainability framework. Encouraging active participation of local residents through awareness programmes, environmental education, and community-driven initiatives would further empower communities in eco-tourism development. Strengthening institutional support-particularly in areas such as conservation management, cultural preservation, financial facilitation, and policy advocacy-would enhance the overall effectiveness of governance efforts. Together, these measures can help ensure that eco-tourism serves not only as a source of livelihood but also as a pathway toward long-term socio-environmental resilience. At the stakeholder level, policymakers should integrate sustainability principles and equitable revenue-sharing into tourism policies, while eco-tourism practitioners are encouraged to collaborate with local communities in designing culturally resonant and environmentally responsible experiences. Local communities, in turn, should organise cooperatives or development councils to enhance collective participation, governance accountability, and equitable distribution of tourism benefits.

The study contributes to the broader theoretical understanding of how decentralised governance systems operationalise sustainable development principles in community contexts. By empirically validating the multidimensional constructs of "role" and "support," it provides a framework for assessing institutional effectiveness in similar eco-tourism settings. Practically, it offers a replicable model for regions seeking to balance economic growth with ecological stewardship through participatory governance.

The analysis was restricted to a sample of 155 respondents from two Gram Panchayats within the KVCR region, which may limit the generalisability of the findings to other eco-tourism contexts. The cross-sectional design restricts the ability to infer long-term causal effects. Additionally, the study relied primarily on self-reported data, which may introduce perceptual bias. These limitations highlight several promising directions for future research. Longitudinal and comparative studies could help examine how the involvement of Local Self-Governance Structures (LSGS) changes over time across different eco-tourism sites, offering deeper insights into evolving governance patterns. Incorporating social capital dimensions-such as trust, cooperation, and community cohesion—would further enrich understanding of how relational factors influence development outcomes. Additionally, developing location-specific indicators could enable more nuanced assessments of eco-tourism's social, economic, and environmental contributions. Finally, exploring the inclusivity impacts of eco-tourism initiatives, particularly on women, youth, and marginalised groups, would support the design of more equitable and sustainable governance models.This research underscores that sustainable community development through eco-tourism is not merely an outcome of economic activity but a product of effective local governance and institutional support. Empowered and participatory LSGS mechanisms—grounded in accountability, inclusivity, and ecological sensitivity—are pivotal for translating eco-tourism potential into tangible community benefits. By linking empirical validation with governance theory and practical policy insights, the study contributes a comprehensive framework for advancing community-based eco-tourism and decentralised development in similar socio-ecological contexts.

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Job Attitude of Indian Scientists Based on Job Demands and Resources Model

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Abstract: This study evaluates scientists' job attitudes based on their perceptions of job characteristics and examines whether work engagement mediates the relationship between job challenges and recognition. An online survey collected data from scientists at various research institutes and laboratories of the Council of Scientific and Industrial Research (CSIR) in India. The findings indicate that work experience has a significant impact on scientists' perceptions of job challenges, contributions, recognition, and satisfaction, with no notable gender differences observed. Additionally, job contributions, recognition, and challenges significantly affect job satisfaction, with job challenges directly linked to the desire for recognition. This paper highlights the job demands of scientists and offers recommendations for governments and organizations to enhance scientists' well-being, implement effective recognition systems, and promote career development.

1. Introduction

India has been steadily progressing toward becoming a developed economy and has established itself as a major player in science, technology, and research. Government organizations, such as research institutions and laboratories, exemplify teamwork, group effort, ongoing coordination, and team cohesion. These organizations require employees to demonstrate higher levels of work engagement. However, the bureaucratic management style often used in Indian government organizations has led to centralization of authority and delays in decision-making. Organizations, especially scientific research institutes, are top priorities for the nation. They help the country achieve sustainable growth and progress through continuous research and development. Recent examples include landing 'Chandrayan-3' on the Moon's south pole, Aditya-L1, and Ganganyaan. This remarkable achievement reflects the hard work, dedication, commitment, and engagement of our scientists (Singh, 2025). Undoubtedly, scientists face demanding jobs that require increased energy, time, and motivation. Furthermore, the institutions where they work often become their most important community—sometimes replacing their own family, friends, and social groups. Therefore, governments should recognize that scientists are more than just a cost to the nation; they have souls, dreams, and a need to feel a-sense of purpose and fulfillment in their work.

According to Fisher et al. (2017), jobs that involve high mental, physical, and stressful demands can affect employees' cognitive abilities. Additionally, changes in brain function over a person's lifespan can influence workplace behavior, including motivation, learning, development, performance, and job security. In this context, Jena and Pradhan (2018) emphasized that workplaces should be as humane as possible, treating employees as individuals with unique sensitivities that must be respected, fostering a mutually coexisting environment. Furthermore, Sypniewska et al. (2023) advocated for sustainable human resource management (SHRM) practices to enhance organizational effectiveness by building long-term relationships with employees. Essentially, SHRM focuses on developing personnel to drive organizational growth, which includes promoting a healthy work-life balance, enhancing employee engagement, job satisfaction, commitment, productivity, and overall well-being. It is proven that the work environment is closely linked to employees' attitudes, behaviors, and performance (Brown & Leigh, 1996; Walumbwa et al., 2017; Kleine et al., 2019). To foster a healthy relationship between employees and the organization characterized by increased engagement, job satisfaction, commitment,

and productivity, organizations should implement sustainable human resource management practices (Al Kurdi et al., 2021; Diriye et al., 2021; Mira et al., 2019).

The current study applies the Job Demands-Resources (J-D-R) model to assess scientists' job attitudes. This model provides a structured framework for examining job characteristics and their impact on employee health and well-being (Bakker & Demerouti, 2007; Demerouti et al., 2001; Meijman & Mulder, 2013). In the J-D-R framework, job characteristics are classified as either demands or resources. Job demands, such as emotionally demanding interactions or high-pressure situations, refer to the physical, psychological, social, or organizational aspects of a job that require sustained effort and can lead to physiological or psychological costs. When these demands require significant effort and employees are unable to recover correctly, they can become sources of stress (Meijman and Mulder, 1998). Conversely, job resources—such as supportive work relationships—are elements that help reduce demands, support goal achievement, and foster personal growth, learning, and development. Therefore, job resources not only help employees manage demands but also serve as motivational factors.

Thus, in accordance with the J-D-R Model, this study aims to assess scientists' perceptions of their job demands, which encompass aspects such as job challenges, work engagement, and contributions, as well as job resources, including recognition and job satisfaction. Furthermore, it aims to examine variations in scientists' perceptions based on gender and work experience, while also investigating the mediating role of work engagement between scientists' job challenges and their recognition. This study aims to expand the field of Industrial/Organizational Psychology by addressing specific questions and providing valuable insights to the Indian government and related organizations, such as the Council of Scientific and Industrial Research (CSIR) and the Ministry of Science and Technology. The focus is on enhancing job satisfaction, managing stress, improving recognition and rewards, promoting overall well-being, and advancing the careers of scientists. Additionally, it seeks to refine human resource management practices within research institutes across India.
Research Questions:

RQ1: How do job challenges, contributions, and recognition within Indian scientific institutions influence the job satisfaction of scientists?

RQ2: Does work engagement among scientists act as a mediator between job challenges and recognition?

RQ3: Are the job challenges faced by scientists directly linked to their desire for recognition?

RQ4: How do gender and work experience affect scientists' perceptions of job challenges, contributions, recognition, and satisfaction within research institutes in India?

2. Review of Literature
2.1. Job-Demand and Resource (J-D-R) Model

According to Sulea et al. (2012), occupational risk factors for job-related stress can be categorized into job demands and job resources. Job demands refer to the physical, psychological, social, or organizational factors related to work that require a consistent amount of effort or skills. These demands can lead to various costs, such as mental stress, job burnout, and feelings of dissatisfaction in the workplace. While these demands are not necessarily negative, they can become stressors when the effort required goes beyond what the employee can recover from (Meijman & Mulder, 1998). On the other hand, job resources are the physical, psychological, social, or organizational elements that ease the workload, mitigate the impact of job demands, foster personal growth, and provide opportunities for learning. These resources serve as motivating factors that enhance job engagement, increase job satisfaction, and promote behaviors that extend beyond the typical job role (Demerouti & Bakker, 2011; Sulea et al., 2012).

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Scientific organizations often have rigorous work environments with irregular working hours. In this context, scientists' work challenges and contributions are job demands, while recognition and satisfaction at work are job resources.

2.2. Linkage between Job Challenges, Contribution, Recognition, and Satisfaction

According to Kauppila (2025), job challenges, recognition, perceived contribution, and job satisfaction are evaluative phenomena that employees form perceptions based on their observations and experience. These evaluations can be both cognitive (involving beliefs or thoughts) and affective (involving feelings) in nature. Job satisfaction, for example, is defined as an attitude or favourable feeling or perception of employees towards their job or work task (Schneider & Snyder, 1975; Kauppila, 2025). Several factors, such as individuals' personality, working environment, and job characteristics, influence employees' job satisfaction (Agho et al., 1993; Singh, 2025). In addition to satisfaction, the nature of job challenges also shapes employee experience. For instance, Zimmerer & Baglione (2009) defined a work challenge as something that inspires employees' determination to improve their ability to overcome problems, which may include new problems, tasks to be solved, and finding suitable solutions.

Furthermore, Yang & Li (2021) observed that work challenges and hindrances act as workplace stressors, potentially resulting in emotional responses such as anger, anxiety, and heightened attentiveness. In parallel, recognition for work is defined as the expression of non-financial appreciation in response to exceptional achievement or performance (Weziak-Bialowolska & Bialowolski, 2022). Studies have shown that recognition positively influences job performance, psychological health at work, and employee satisfaction (Weziak-Bialowolska & Bialowolski, 2022; Wydyanto, 2022). Building on these findings, Haitao (2022) reported that both work challenges and recognition have a significant impact on employees' job satisfaction in the workplace. Similarly, Singh (2023, 2025) described the unique context for scientists, whose jobs are very rigorous, creating mental stress and solitude, while the perceived recognition for their contributions remains insufficient. Based on the previous finding, we proposed that:

H1: Job satisfaction among scientists is directly impacted by their job characteristic elements, such as challenges, contribution, and recognition for work.

H2: The job challenges of the scientists are directly linked to their desire for recognition.

2.3. Association between Gender, Work Experience, Job Attitude, and Job Characteristics

According to Singh & Jain (2013) and De Frias & Schaie (2001), demographic features such as personality, education, expectations, age, gender, and occupation each have a significant impact on individuals' work motivation. For instance, work tenure has a direct and positive impact on job satisfaction (Mothema et al., 2025), indicating that increased tenure typically leads to greater job satisfaction. More specifically, Ng & Sorensen (2008) found that workplace social support and socialization contribute more to job satisfaction among women than men. According to Konrad & Harris (2002), a rise in gender equity may prompt men to adopt values traditionally considered feminine, while also encouraging women to adopt traditionally masculine values. Building on these findings, work tenure emerges as a significant variable influencing employees' work behavior and performance within organizations (Ng & Feldman, 2013).

Conversely, Han et al. (2024) highlighted that the working environment, job characteristics, interpersonal relationships within the workplace, work-life balance, as well as income and benefits, are significant factors influencing employees' happiness and commitment. Kumar and Giri (2009) confirmed that individuals' work experience, satisfaction, and commitment at the workplace are positively correlated with one another. In comparisonYeo & Ha (2025) found that individuals' age, marital status, work experience, monthly household income, health, and work-life balance significantly impacted their work satisfaction.

In the context of India, an emerging developed country, the government has in recent years strongly emphasized women's workforce participation in various sectors, including politics, science, space, finance, banking, and entrepreneurship. Therefore, we assume that the scientists' gender and work experiences significantly influenced their job attitudes. Thus, the hypotheses of the study are-

H3: There is a difference in scientists' perceptions of job challenges, contributions, recognitions, and satisfaction at research institutes based on gender.

H4: There is a difference in scientists' perceptions of job challenges, contributions, recognitions, and satisfaction at research institutes based on their work experience.

2.4. Mediator Role of Work Engagement

Work engagement (WE) refers to the physical, cognitive, and emotional involvement of individuals in their workplace (Kahn, 1990; Yalabik et al., 2013). It is characterized as an affective-motivational, work-related state comprising vigour, dedication, and absorption. Vigour encompasses an employee's energy, mental resilience, willingness to invest effort, and persistence in the face of job challenges. Dedication involves a psychological identification with one's work, accompanied by feelings of significance, enthusiasm, inspiration, pride, and a sense of challenge. Absorption describes deep immersion and concentration in work, resulting in a loss of awareness of time and difficulty detaching from tasks (Schaufeli et al., 2006). Engaged employees typically demonstrate greater accountability for their performance and closely associate their work outcomes with their identity (Bakhshi & Gupta, 2016). Recent studies suggest that work engagement acts as a complete mediator in the relationship between subjective well-being and both work performance and mental health issues. Furthermore, it acts as a partial mediator in the correlation between subjective well-being and work withdrawal behaviors, as well as physical health concerns (Garg & Singh, 2020). Additionally, work engagement has been found to mediate the relationships between affective commitment, job performance, and intention to quit (Yalabik et al., 2013). Previous studies have found that scientists' jobs are highly challenging and stressful (Singh, 2023), and that scientists often perceive a lack of recognition (Singh, 2025). Despite these challenges, scientists exhibit high levels of work engagement, i.e., vigour, absorption, and dedication (Singh, 2025). Hence, we proposed that:

H5: Work engagement significantly mediates the linkage between job challenges and recognition of work.

3. Research Methodology

3.1. Sampling Design

Data were gathered from scientists affiliated with various research institutes and laboratories of the Council of Scientific and Industrial Research (CSIR) in India. An online survey, administered through Google Forms via email and WhatsApp, was employed to collect data using both probability (random) and non-probability (convenience or snowball) sampling techniques. The data collection period extended over three months, from December 2023 to February 2024. We reached out to over 2,000 scientists using their official email addresses and received responses from approximately 230 individuals. Out of these, 55 responses were excluded due to incompleteness, resulting in 175 usable questionnaires. The respondents included 78% male and 22% female scientists. The majority of the respondents were married (80%), aged between 30 and 40 years (47%), and held a Doctorate (76%). An examination of the respondents' tenure within their respective organizations revealed that most possessed over 15 years of experience (35%), followed by those with 5 to 10 years of experience (28%), forming the principal groups (see Table 1). This study employs a causal research design using cross-sectional data. Additionally, the cross-sectional survey method is more effective in elucidating the relationships among variables (Cooper & Schindler, 2014).

Table 1: Details of the Respondents

Demographic Features		Number	Percentage
Gender	Male	137	78%
	Female	38	22%
Age	Below 30 years	17	10%
	30-40 years	81	47%
	40-50 years	47	26%
	Above 50 years	30	17%
Education	Master	43	24%
	Doctorate	132	76%
Marital Status	Married	34	20%
	Unmarried	141	80%
Work Experience	Below 5 years	33	19%
	5-10 years	49	28%
	10-15 years	33	18%
	More than 15 years	60	35%

Source: Primary data.

3.2. Instruments

To measure job challenges, contributions, and recognition of the work of scientists at their workplace, we have adapted items from Brown & Leigh's (1996) scale. The Affective Job Satisfaction index, developed by Thompson & Phua (2012), is used to measure the job satisfaction of the scientists. Respondents were asked to use a seven-point Likert-type scale, ranging from "strongly disagree" (1) to "strongly agree" (7), to indicate their perceptions. The Utrecht Work Engagement Scale (UWES-9 items), developed by Schaufeli, Bakker, and Salanova (2006), is used to measure work engagement among scientists. The scale has three dimensions, such as vigor, dedication, and absorption, and was measured on a seven-point Likert-type scale, ranging from "never" (1) to "always" (7). Table 2 presents the reliability coefficient, along with descriptive statistics, for these variables.

Descriptive statistics such as Mean and S.D., t-test, One-way ANOVA, Pearson correlation, multiple linear regression, and PROCESS Macro model 4 in SPSS Version 4.2 beta are employed for data analysis in this study. Figure 1 provides a visual representation of the framework for the present study.
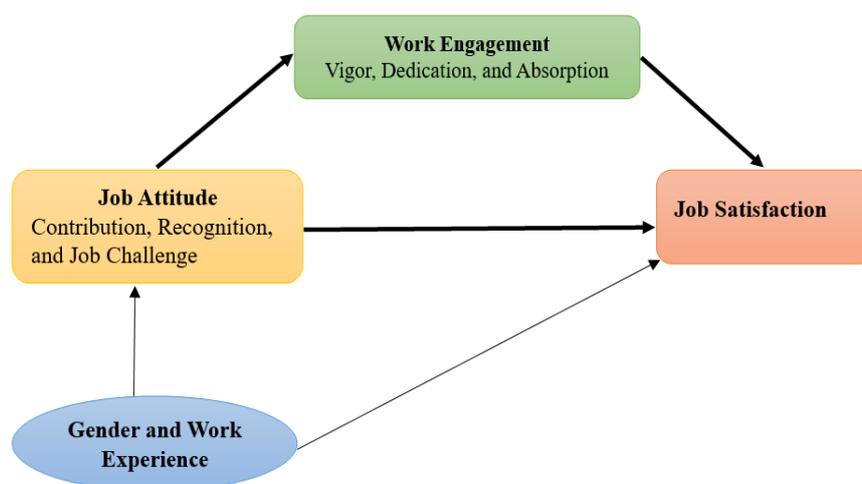

Figure 1: Model of the Study

4. Result and Discussion

The means and standard deviations for all variables are presented in Table 2, along with the reliability coefficients. The results are as follows: Job Contribution (CN) ($\alpha = 0.88$), (M = 5.64, SD = 1.13); Recognition to Work (RN) ($\alpha = 0.74$), (M = 4.97, SD = 1.21); Job Challenges (JC) ($\alpha = 0.74$), (M = 5.64, SD = 1.11); WE total ($\alpha = 0.91$), (M = 5.55, SD = 1.06); VI ($\alpha = 0.75$), (M = 5.15, SD = 1.19); DE ($\alpha = 0.89$), (M = 5.92, SD = 1.19); AB ($\alpha = 0.85$), (M = 5.59, SD = 1.12); and JS ($\alpha = 0.91$), (M = 5.66, SD = 1.21). It is found that all scales exceed the criterion of 0.70 for Cronbach's alpha, indicating satisfactory internal consistency (Nunnally and Bernstein, 1994). A quick inspection of the mean scores reveals that all values are higher than the midpoint of their respective scales. This suggests that respondents reported higher levels of job challenges and contributions compared to work recognition, as well as reasonably high levels of work engagement and job satisfaction.

Table 2 Correlation matrix along with Descriptive Statistics and Cronbach Alpha

Variables	Job Contribution	Job Recognition	Job Challenge	Work Engagement	Job Satisfaction
Job Contribution	1				
Job Recognition	0.64**	1			
Job Challenge	0.33**	0.23**	1		
Work Engagement	0.69**	0.49**	0.39**	1	
Job Satisfaction	0.69**	0.58**	0.26**	0.80**	1
Mean	5.64	4.97	5.64	5.55	5.66
S.D.	1.13	1.21	1.11	1.06	1.21
Cronbach Alpha	0.88	0.74	0.74	0.91	0.91

Note: **$p < 0.01$ level (2-tailed)
Source: Primary data.

According to the outcomes in Table 2, significant positive correlations were found among all variables ($p < 0.05$). The job contribution strongly and positively correlated with scientists' job recognition (r = .64), satisfaction (r =.69), and work engagement (r =.69). Similarly, work engagement strongly correlated with job satisfaction (r =.80). Additionally, there is a moderate correlation between job recognition, satisfaction (r = .58), and work engagement (r = .49). However, the increase in job challenges leads to lower job contribution (r = .33), recognition (r = .23), work engagement (r = .39), and satisfaction (r = .26) to the scientists.

The outcomes of Table 3 illustrate that job characteristics variables, such as contribution, recognition, and challenges, caused 47%, 34%, and 6% changes in the job satisfaction of scientists. Additionally, job contribution (β = .74, t = 12.48, F = 155.74), job recognition (β = .58, t = 8.83, F = 88.89), and job challenges (β = .28, t = 8.93, F = 12.01) of the scientists significantly impacted their job satisfaction ($p < 0.05$). It is also noted that the job challenges faced by scientists caused only a 5% change in their desire for work recognition. Moreover, the job challenges of scientists are directly and significantly linked to their desire for recognition (β = 0.25, t = 3.06, F = 9.36, $p < 0.05$). Thus, we accepted H1 and H2.

Table 3: Causal Relationship among Job Characteristics and Outcomes

Path coefficient	B	t-value	R^2	F-statistic	p
CN ⟶ JS	0.737	12.48	0.474	155.74	0.000
RN ⟶ JS	0.579	8.83	.339	88.89	0.000
JC ⟶ JS	0.277	8.93	.065	12.01	0.001
JC ⟶ RN	0.247	3.06	.051	9.36	0.003

Note: $p < 0.05$; CN-Job Contribution; RN-Job Recognition; JC-Job Challenges; JS-Job Satisfaction.
Source: Primary data.

The outcomes of Table 4 indicate that there is no significant difference found in job contribution, recognition, challenges, and satisfaction among scientists based on their gender ($p > 0.05$).

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Table 4: Relationship between Job Characteristics and Outcomes based on scientists' gender

Job Characteristics & Outcome	Male	Female	t-test	p
Contribution	5.69 (1.11)	5.47 (1.15)	1.12	.263
Recognition	4.99 (1.22)	4.96 (1.22)	.131	.896
Job Challenge	5.63 (1.14)	5.71 (1.02)	-.405	.686
Job Satisfaction	5.71 (1.19)	5.48 (1.27)	1.055	.293

Source: Primary data.

However, there is a significant difference in the job contribution, recognition, challenges, and satisfaction among scientists based on their work experience. In other words, higher work experience among scientists leads to greater job contributions, recognition, challenges, and satisfaction (Table 5). Thus, we reject H3, whilst accepting H4.

Table 5: Relationship between Job Characteristics and Outcomes based on scientists' work experience

Job characteristics & Outcome	<5 years	5-10 years	10-15 years	>15 years	F	p
Contribution	5.54 (.96)	5.21 (1.23)	5.59 (1.08)	6.09 (1.01)	6.19	0.001
Recognition	5.07 (.99)	4.59 (1.17)	4.80 (1.29)	5.33 (1.23)	3.86	0.01
Job Challenge	5.19 (1.27)	5.70 (.88)	5.40 (1.27)	5.97 (1.01)	4.26	0.006
Job Satisfaction	5.32 (1.48)	5.31(1.21)	5.78 (.86)	6.07 (1.08)	4.93	0.003

Source: Primary data.

The result of Table 6 shows that job challenges impacted 24% (R^2 = .24) changes in the job recognition after adding the mediating effect of WE (F = 26.82; p<0.05). Moreover, results show the total effect [β = .25, SE = .081, 95% CI (.088, .407)], direct effect [β = .048, SE = .079, 95% CI (-.108, .204)], and indirect effect [β = .199, SE = .049, 95% CI (.114, .307)] of scientists' job challenges on their recognition. Thus, we accepted H5.

Table 6: Work Engagement as Mediator between Job Challenges and Job Recognition

Model Summary						
R²	SE	F	p			
.24	1.136	26.82	0.000			
Path	**B**	**SE**	**95% CI**		**t-value**	**p**
			LLCI	ULCI		
JC ⟶ RN	0.048	0.079	-0.108	0.204	0.61	0.545
JC ⟶ WE	0.372	0.067	0.240	0.504	5.57	0.000
WE ⟶ RN	0.536	0.083	0.373	0.699	6.48	0.000
Relationship						
Total Effect	0.247	0.081	0.088	0.407		
Direct Effect	0.048	0.079	-0.108	0.204		
Indirect Effect	0.199	0.049	0.114	0.307		

Note: p<0.05; RN- Job Recognition; JC- Job Challenges; WE- Work Engagement.
Source: Primary data.

In research-based organizations, scientists face high job demands. Their work often involves mental stress, complex problem-solving, rigorous experiments, extensive laboratory work, long hours, irregular schedules, and challenging fieldwork. To support them effectively, it is crucial to provide job resources such as inclusivity, greater rewards and recognition, as well as emotional and instrumental support from their institutions and colleagues. Organizing programs that aid in stress management and conflict resolution can also be beneficial (Sulea et al., 2012). These resources can promote positive behavior, enhance scientists' well-being, support their psychological, social, and physical health, and improve their work-life balance and relationships within the workplace.

This study aims to measure scientists' job attitudes by analyzing the causal links between job demands (such as challenges, engagement, and contributions) and job resources (including recognition and satisfaction). It also investigates differences in perception based on gender and work experience and examines the mediating effect of work engagement on the relationship between job challenges and recognition. The results indicate that male and female scientists perceive similar levels of job demands, including work challenges and contributions. However, perceptions vary based on work experience. More experienced scientists tend to contribute more, take on greater job challenges, and achieve higher levels of recognition and satisfaction. These findings align with previous research (Ng and Feldman, 2013; Mothema et al., 2025; Yeo & Ha, 2025).

Additionally, the study highlights that scientists' job challenges can lead to lower satisfaction and recognition. It concludes that the scientists' work requires significant mental effort and long hours, which can lead to stress and negatively impact health, performance, and work-life balance. Conversely, when scientists feel they are making a greater contribution, it enhances their job satisfaction and recognition, supporting the findings of Kutty et al. (2019). Finally, the current study concludes that scientists' perceptions of job challenges do not directly influence the recognition of their work. However, when these challenges are paired with high work engagement, they can have a significantly positive impact on recognition in the workplace.

5. Conclusion

This study aims to assess scientists' job attitudes by examining the causal relationships between job demands, such as challenges, engagement, and contributions and job resources, including recognition and satisfaction. It also explores how perceptions vary by gender and work experience, as well as the mediating role of work engagement in the relationship between job challenges and recognition. The findings indicate that work experience has a significant impact on scientists' perceptions of challenges, contributions, recognition, and job satisfaction. However, there is no notable correlation between gender and job characteristics. Moreover, job factors such as recognition and challenges have a significant influence on job satisfaction, with job challenges closely linked to the desire for recognition.

This study provides both theoretical and practical insights, focusing on how job and personal characteristics influence employees' job attitudes in research-based organizations. Theoretically, our findings contribute to the field of organizational behavior management by simultaneously examining these characteristics for the first time, thereby advancing the Job Demands-Resources (J-D-R) literature. We clarify how demographic variables and job characteristics shape employees' mindsets and workplace behaviors. By fostering engagement and implementing adequate rewards and recognition systems, organizations can enhance effectiveness, reduce dissatisfaction, and boost employee morale and motivation, which in turn leads to increased work contribution and job satisfaction.

Practically, these insights can help government bodies, such as the Ministry of Science and Technology and the Council of Scientific and Industrial Research (CSIR), understand how job resources drive motivation, resulting in greater organizational commitment and job satisfaction (Hakanen, Bakker, & Schaufeli, 2006). Satisfied employees tend to be more enthusiastic, productive, and less prone to burnout (Javidpour et al., 2025). This research also advocates for CSIR's investment in emotional intelligence training and psychological capital programs to promote teamwork, encourage extra-role behaviors, and alleviate workplace stress (Singh, 2025). Organizations that cultivate emotional intelligence foster harmonious work environments that support cooperation, reduce stress, and enhance job satisfaction (Woime & Shato, 2025).

In a research-oriented work culture, work engagement catalyzes group performance (Salanova et al., 2003). Grounded in self-determination theory, this study demonstrates that work contexts that promote autonomy, competence, and relatedness are beneficial for fostering intrinsic motivation and well-being (Ryan and Frederick, 1997). Effective practices, such as providing proper feedback and social support, further enhance learning, engagement, satisfaction, and commitment (Salanova & Schaufeli, 2008). Overall, this study advocates for sustainable human resource practices - such as

timely project funding, social support, and initiatives improve that promote psychological and emotional intelligence - to proactively encourage positive work behavior, strengthen work-life balance, and enhance job satisfaction and engagement while effectively managing job demands. However, the current study has certain limitations. First, our results may be affected by common method variance, as we relied on self-report questionnaires to assess job characteristics, work engagement, and job satisfaction. Although many studies in this field use self-reports (Salanova & Schaufeli, 2008; Sulea et al., 2012), future research could improve our model by incorporating expert ratings and interviews to evaluate job demands and resources, work engagement, well-being, and satisfaction. Additionally, it would be beneficial for future studies to examine the influence of ethical leadership and perceived social support on reward and recognition. Lastly, since our study used a cross-sectional design with a small sample size, future research should involve larger samples within a longitudinal framework.

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