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The journal aims to serve as a credible academic platform for researchers, educators, policymakers, and practitioners by fostering rigorous inquiry, critical debate, and interdisciplinary dialogue. The journal seeks to contribute meaningfully to the development of theory, empirical understanding, and applied knowledge in business management within national, regional, and global contexts.

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Article

Tourism Spending in Crisis: Assessing the Impact of COVID-19 on Indian Households Through Difference-in-difference Analysis

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Abstract

The COVID-19 pandemic severely impacted the tourism sector, disrupting livelihoods, public services, and the global economy. Travel restrictions reduced travel flows, altering household spending patterns and hindering tourism-driven economic growth. Despite its significance, limited micro-level research exists on this issue. This study examines the impact of COVID-19 on tourism spending by Indian households using Consumer Pyramids Household Survey data and a difference-in-differences (DID) approach. Findings reveal a 34% decline in average tourism expenditure post-pandemic, with rural areas experiencing a sharper 62% drop compared to urban regions. While key determinants of tourism spending remain significant, gender does not appear to influence expenditure. These insights offer valuable guidance for policymakers and tourism professionals in understanding household tourism behavior and formulating targeted strategies to revive the sector in the post-crisis era.

Keywords

COVID-19, Domestic Tourism Expenditure, Difference-in-difference Analysis, *t*-test, PSM, India

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Introduction

Prior to the COVID-19 era, numerous studies had recognized the tourism industry's contribution to economic growth in both developed and developing countries (Dritsakis, 2004; Eugenio-Martin et al., 2004; Inchausti-Sintes, 2015; Shi & Li, 2017), citing its positive long-term correlation with GDP (Banday & KOCOGLU, 2015; Lee & Chang, 2008), employment, foreign exchange earnings, revenue generation, social and economic infrastructure development, gender gap mitigation, and women empowerment (Athma & Nalini, 2013; Dwyer et al., 2004; Khan et al., 1990; Ohlan, 2017; Tang & Abosedra, 2016; WTTC, 2021b). However, the pandemic has caused not only a global health disaster but also an economic crisis (Haryanto, 2020), with profound impacts on the growth structure of the tourism industry in emerging markets like India. The first COVID-19 case in India was reported in January 2020 (PIB, 2020), followed by a nationwide lockdown and restrictions on travel, which significantly slowed down the economy's expansion and devastated the tourism sector (Kukanja et al., 2020; Shretta, 2020; Uğur & Akbıyık, 2020; Shao et al., 2021; Singh et al., 2021; Uglis et al., 2022). Additionally, many countries closed their borders, resulting in a 49.1% drop in GDP contribution and a direct employment loss of 18.5% (61.6 million jobs) in the tourism industry. In India, the tourism sector's contribution to GDP declined by 36.3% in 2020 in comparison to the previous year, coupled with a 20.8% reduction in employment. Both foreign and domestic tourist expenditures declined by 61% and 30.7%, respectively (WTTC, 2021a). Hence, to gain a better understanding of the situation and the pandemic's effects on the travel industry, it is crucial to investigate the current tourism scenario and expenditure status, particularly at the micro-level. This information can help policymakers and tourism practitioners manage the pandemic's current and future impacts on the industry effectively. Therefore, adding the COVID-19 pandemic as one of the essential determinants in the households' tourism spending model is imperative to avoid misspecification. Otherwise, this might lead to faulty results and inadequate policy recommendations.

Thus, modeling the pre- and post-COVID-19 impact on domestic tourist spending in India can be a significant issue in tourism research. While the growth of the tourism industry has attracted significant attention from scholars and practitioners, including studies exploring the factors that influence households' tourism spending (Brida & Scuderi, 2013; Cai, 1999; Lin et al., 2021; Nayak et al., 2022; Sahoo et al., 2022), there is limited knowledge on the impact of COVID-19. Therefore, our study aims to evaluate the effect of the pandemic on domestic visitors' spending in India. Although the number of tourists may decline, their average spending on tourism may increase due to several reasons. Firstly, tourists may spend more on safety-related measures. Secondly, low-income households are disproportionately affected by the pandemic, meaning that only higher-income households may be able to undertake tourism. As income is positively associated with tourism expenditure, the higher-income traveler spending is likely to be higher, tourism being a necessary good for them (Sahoo et al., 2022). Moreover, the COVID-19 restrictions may lead to feelings of despair, anxiety,

boredom, frustration, dread, sadness, and rage (Girish, 2021; Wang & Xia, 2021), which could increase people's desire to travel (Boto-Garcia & Leoni, 2021; Cretu et al., 2021; Ivanova et al., 2021). This desire has led to the phenomenon of "revenge tourism" (Abdullah, 2021; Girish, 2021; Guerra et al., 2024), where people travel to overcome lockdown fatigue, leading to an increase in the number of tourists.

However, this research contributes to the limited literature on the determinants of domestic tourism spending in Indian households in three ways. First, this study incorporates the COVID-19 period, which witnessed a lower growth in the Indian tourism industry. But the literature on the analysis of domestic tourism spending of Indian households during the pre- and post-COVID-19 pandemic remains limited. Second, this study also investigates the impacts of pre- and post-COVID-19 outbreaks on tourism spending in rural and urban households in India. Third, this research employs the difference-in-difference (DID) method to model these research gaps.

Based on the above discussion, the following hypotheses need to be empirically tested:

H_1: COVID-19 has no significant impact on domestic tourism spending.
H_2: There is no difference in the impact of COVID-19 on tourism spending between rural and urban households.

The structure of this study is as follows. The second section presents a review of the relevant literature. The third section outlines the methodology and describes the dataset used in the analysis. The fourth section analyzes and presents the empirical results. Finally, the fifth section provides a conclusion to the study.

Literature Review

Tourism is one of the most affected sectors by crises and health shocks/pandemics, whether global or regional. Previously, diseases like Ebola (Maphanga & Henama, 2019; Novelli et al., 2018), SARS (Au et al., 2005; Cooper, 2006; Dombey, 2004; Kuo et al., 2008; McKercher & Chon, 2004), MERS (Joo et al., 2019; Kim, 2017), and Swain flu (Haque & Haque, 2018; Page et al., 2012) had influenced the tourism industry harshly, causing a drop in tourism demand, visitor arrivals (Cahyanto et al., 2016; Kuo et al., 2008; Page et al., 2012; Shi & Li, 2017), and tourism expenditure. Tourism is a very competitive industry, and the spread of these infectious diseases has a detrimental influence on tourism growth (Sifolo & Sifolo, 2015).

The global outbreak of COVID-19 has resulted in a devastating impact on the world economy, with the tourism industry being one of the most severely affected sectors (Arbulú et al., 2021; Shretta, 2020; Singh et al., 2021; Škare et al., 2021; UNWTO, 2021). Due to its sensitivity to disasters, external hazards and health crises (Arbulú et al., 2021; Williams & Baláž, 2015), tourism has always been vulnerable, and COVID-19 has only aggravated this situation. The fear of

COVID-19 and the restrictions imposed to control its spread have led to a rapid decline in tourist arrivals (Cahyanto et al., 2016; Kuo et al., 2008; Page et al., 2012; Shi & Li, 2017; Singh et al., 2021; UNWTO, 2021) and have created uncertainty about future travel behavior (Binder, 2020; Foo et al., 2021; Immordino et al., 2022; Karl et al., 2021; Kock et al., 2020; Li et al., 2020; Miao et al., 2021; Rutynskyi & Kushniruk, 2020; Singh et al., 2020; Uglis et al., 2022; Uğur & Akbıyık, 2020). Consequently, there has been a decrease in tourism consumption expenditure, leading to a negative impact on tourism revenue, output, employment, and GDP, which has changed the dynamics of the economic growth cycle (Arbulú et al., 2021; Blake et al., 2003; Günay et al., 2020; Mariolis et al., 2021; Rosselló et al., 2017; Škare et al., 2021).

People were encouraged to stay at home to prevent the spread, leading to a sharp decline in all categories of spending (Alexander & Karger, 2020). However, the travel, entertainment, and restaurant sectors have been particularly hard hit (Baker et al., 2020; Chen et al., 2021), while groceries, food, and stockpiles have seen increased demand (Chronopoulos et al., 2020). Consumer demand, as well as consumption, were falling as a consequence of the fear effects: uncertainty, unsafe, anxious behavior, and economic effect of employment and income loss due to COVID restrictions (Bae & Chang, 2021; Chen et al., 2021; Coibion et al., 2020; Cox et al., 2020; Martin et al., 2020; Neuburger & Egger, 2021). Such a pandemic typically crashes both the demand and supply sides in most economic activities, but travel and tourism are mostly affected by the demand side (Arbulú et al., 2021; Blake et al., 2003; Gupta & Kishore, 2021; Nyarko et al., 2015; Rosselló et al., 2017).

Moreover, due to the risk of infection and the economic impact caused by job and income loss (Bartik et al., 2020; Dreger & Gros, 2021; Parvathamma, 2020), people were compelled to delay or cancel their travel plans, resulting in a decline in travel demand (Foo et al., 2021; Immordino et al., 2022; Rutynskyi & Kushniruk, 2020; Singh et al., 2021; Uglis et al., 2022; Uğur & Akbıyık, 2020). In addition, even if they had made plans, spending on vacation, dining out, and entertainment fell significantly. However, Wen et al. (2020) discovered that travelers may have reduced the number of their plans but spent more than they would have in the pre-COVID-19 time. Furthermore, Baños-Pino et al. (2023) found that travel expenditures remained consistent before and after the COVID-19 outbreak for each person and each day, with minor changes in the categories of their travel expenses. But Guerra et al. (2024) found that there is a higher tourism spending due to more expenses on side goods like food and beverages and for safety purposes.

Despite some research, there is still uncertainty about the impact of COVID-19 on domestic tourism spending in India and other emerging market economies, as some research has produced conflicting views on whether it has risen, dropped, or remained unchanged. Therefore, further investigation is needed in this area. While several studies have examined how COVID-19 affects total household consumption, there has been little direct investigation into its impact on domestic travel spending, particularly in India. Hence, this study aims to fill this gap in the literature by evaluating the effect of COVID-19 on domestic tourism expenditure.

Data and Methodology

Data

The current study utilizes data from the Consumer Pyramids Household Survey (CPHS), conducted by the Centre for Monitoring Indian Economy (CMIE) using a multi-stage stratification method in India. Primary sampling units are villages and towns from the 2011 Census, while households serve as the ultimate sampling units. The CPHS provides information about household characteristics, such as age, gender, education, occupation and family size, along with the various types of consumption. To analyze the objective, the study used vacation spending data from March 2019 to February 2021, covering a period of one year before and after the COVID-19 lockdown.

Methodology

DID Model

This study employs a DID model to estimate the impact of COVID-19 on domestic tourism spending in India. It is a quasi-experimental design that originated in the field of econometrics to measure the causal inference even when randomization is not possible and it is better than a simple time-series analysis, showing a logical before-and-after and treatment-control group comparisons (Fredriksson & Oliveira, 2019; Waldfogel, 1999). DID is commonly used to assess the impact of a given intervention or therapy on a collection of persons over time by examining the changes in the outcomes (Baker et al., 2020; Villa, 2012). The approach makes use of longitudinal data (panel data or repeated cross-sections) from treatment and control groups for effect evaluations by comparing the before-and-after changes.

Precisely, the framework is presented in Equation (1).

$$DID = \left\{E\left(TE_{gt}=1 \mid P_{gt=1}=1, T_g=1\right) - E\left(TE_{gt}=1 \mid P_{gt=1}=0, T_g=0\right)\right\} - \left\{E\left(TE_{gt}=0 \mid P_{gt=0}=0, T_g=1\right) - E\left(TE_{gt}=0 \mid P_{gt=0}=0, T_g=0\right)\right\} \quad (1)$$

Here TE_{gt} is the outcome variable (tourism expenditure) of both treatment ($T_g = 1$, i.e., TE > 0) and control groups ($T_g = 0$, i.e., TE = 0), and P_{gt} shows the pre-treatment (before COVID-19) and post-treatment period (after COVID-19). The basic DID framework is dependent on the availability of two groups of units g, including a treated group to which the treatment is delivered ($P_{gt} = 1$) and a control group to which the treatment is not delivered ($P_{gt} = 0$). Equation (1) is the single DID structure without any covariates. However, the analysis can include covariates (X_g) like region type, gender, age, education, occupation, and household size and can be written as follows:

$$DID = \left\{E\left(TE_{gt}=1 \mid P_{gt=1}=1, T_g=1, X_g\right) - E\left(TE_{gt}=1 \mid P_{gt=1}=0, T_g=0, X_g\right)\right\} - \left\{E\left(TE_{gt}=0 \mid P_{gt=0}=0, T_g=1, X_g\right) - E\left(TE_{gt}=0 \mid P_{gt=0}=0, T_g=0, X_g\right)\right\}. \quad (2)$$

We estimate the following equation as a DID model:

$$TE_{gt} = \beta_0 + \beta_1 T_{gt} + \beta_2 P_{gt} + \beta_3 T_{gt} * P_{gt} + \varepsilon_{gt}, \quad (3)$$

where TE_{gt} stands for tourism expenditure in continuous form for time t and group g (treatment—T and control—C group) of both pre- (March 2019 to February 2020) and post-COVID-19 periods (March 2020 to February 2021). Here, T (treated) is the dummy variable equal to "1" for the households that have tourism spending and "0" otherwise. P is a dummy variable, where "1" stands for the COVID-19 time and "0" otherwise. While β_1 is the treatment coefficient, β_2 measures the time trend change in tourism consumption expenditure for both the treatment and control groups. The coefficient of the interaction term, β_3, gives us our DID estimator or the treatment effect.

Assumptions

The following are the two important DID assumptions to generate an unbiased, reliable assessment of the treatment effect.

(1) The error term is distributed independently of the covariates and has an expectation of zero.
(2) The difference between the "treatment" and "control" groups should remain consistent over time in the absence of treatment. This is also known as the parallel trend assumption.

$$E\left[TE'_{1T} - TE'_{0T}\right] = E\left[TE_{1C} - TE_{0C}\right] \quad (4)$$

DID Estimator

As per the above assumptions, the expected values of outcomes, TE_{gt}, are explained as follows:

$$E\left[TE_{0T}\right] = \beta_0 + \beta_2$$

$$E\left[TE_{1T}\right] = \beta_0 + \beta_1 + \beta_2 + \beta_3$$

$$E\left[TE_{0C}\right] = \beta_0$$

$$E\left[TE_{1C}\right] = \beta_0 + \beta_1.$$

The single difference estimator comparing pre- and post-period differences only in the treatment group is explained as follows:

$$\hat{\beta}_{3,1} = \overline{TE}_{1T} - \overline{TE}_{0T}$$

$$E\left[\hat{\beta}_{3,1}\right] = E\left[TE_{1T}\right] - E\left[TE_{0T}\right]$$

$$\beta_0 + \beta_1 + \beta_2 + \beta_3 - \left(\beta_0 + \beta_2\right) = \beta_1 + \beta_3.$$

Therefore, if there is a time trend, the estimator $\hat{\beta}_{3,1}$ will be biased since we may consider the time trend to be a component of the treatment effect.

So we consider another estimator that compares the average difference between the treatment and control groups.

$$\hat{\beta}_{3,2} = \overline{TE}_{1T} - \overline{TE}_{1C}$$

$$E\left[\hat{\beta}_{3,2}\right] = E\left[TE_{1T}\right] - E\left[TE_{1C}\right]$$

$$\beta_0 + \beta_1 + \beta_2 + \beta_3 - (\beta_0 + \beta_1) = \beta_2 + \beta_3.$$

$\hat{\beta}_{3,2}$ is also found to be biased, caused by specific group effects.

Precisely, DID estimator = (Before-and-after *difference* in average outcome in treated group) − (Before-and-after *difference* in average outcome in the control group).

$$\hat{\beta}_{3,DID} = \overline{TE}_{1T} - \overline{TE}_{0T} - \left(\overline{TE}'_{1T} - \overline{TE}'_{0T}\right) = \overline{TE}_{1T} - \overline{TE}_{0T} - \left(\overline{TE}_{1C} - \overline{TE}_{0C}\right)$$

$$E\left[\hat{\beta}_{3,DID}\right] = \beta_0 + \beta_1 + \beta_2 + \beta_3 - (\beta_0 + \beta_2) - (\beta_0 + \beta_1) - \beta_0 = \beta_3 .$$

The model can also include control variables, explained as follows:

$$TE_{gt} = \beta_0 + \beta_1 T_{gt} + \beta_2 P_{gt} + \beta_3 T_{gt} * P_{gt} + \beta_k X_{gk} + \varepsilon_{gt}, \tag{5}$$

where X_{gk} includes the matrix of household-level control variables, like the composition of region type, gender, age, education, occupation, and household size. This study checked multicollinearity among control variables through the estimation of the variance inflation factor (VIF). All the VIF values are less than 3, indicating no severe multicollinearity among the variables. ε_{gt} is the error term consisting of unobservable factors. Figure 1 shows the graphical explanation of the model.

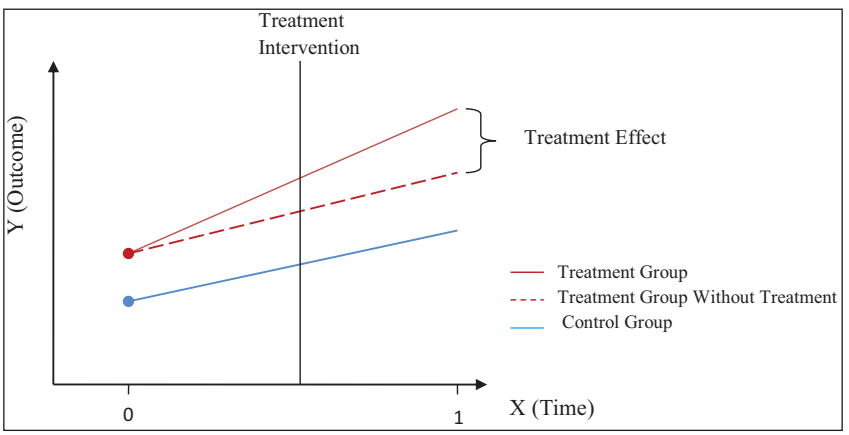


Figure 1. Graphical Demonstration of DID.

For robustness checks 1 and 2, we ran a *t*-test and a propensity score matching (PSM) analysis for the same data set for the above two time periods, respectively. PSM is a quasi-experimental technique that helps to reduce the biasedness and corrects the estimation of treatment effects by comparing the outcomes of the most possible similar treated and control subjects by controlling for the existence of confounding factors (Caliendo & Kopeinig, 2008; Rubin, 1980).

Result and Discussion

Household Characteristics

The dataset comprises 69.04% and 30.96% of the urban and rural households. We have classified households into three gender groups: male-dominated, female-dominated, and balanced gender groups. The female-dominated homes accounted for 41.27% of the total sampled households, followed by the male-dominated, that is, 34.33%, and the remaining samples reflect more of a balanced character (Table 1).

Young dominated (more than 50% of the total members of the family are of 0–25 years) comprises 19.93% of the whole sample, while grownups dominated (26–60 years) consist of 53.29%. The balanced household includes both young dominated and grownup dominated, constituting 26.78% of households. The "better educated" group includes graduate members with all matriculates (34%),

Table 1. Household Characteristics.

Observations: 97,678	Category	Mean	*SD*	Min	Max
Region	Rural	0.310	0.462	0	1
	Urban	0.690	0.462	0	1
Gender[1]	Male dominated	0.343	0.475	0	1
	Female dominated	0.413	0.492	0	1
	Balanced	0.244	0.430	0	1
Age	Young dominated	0.199	0.400	0	1
	Grownups dominated	0.533	0.499	0	1
	Balanced age	0.268	0.443	0	1
Education	Better educated	0.340	0.474	0	1
	Moderately educated	0.270	0.444	0	1
	Least educated	0.390	0.488	0	1
Occupation	Business	0.284	0.451	0	1
	Salaried	0.247	0.431	0	1
	Farmers	0.148	0.355	0	1
	Small traders and daily wage earners	0.222	0.416	0	1
	Miscellaneous	0.099	0.299	0	1
Households	1–5 members	0.871	0.336	0	1
	6–10 members	0.128	0.334	0	1
	>10 members	0.002	0.039	0	1

while the moderately educated group includes households with most of the members having a matriculation level of education only. The least-educated houses are those where some of the members are just literate or have no education at all; most of the families belong to this group (39.04%). Households with business occupations contribute 28.38% of the total sample, followed by salaried, farmers, merchants, and wage earners, and the miscellaneous category with 24.69%, 14.81%, 22.23% and 9.89%, respectively. In the sample, most of the households consist of 1–5 members (87.07%), followed by 6–10 members (12.78%) and more than 10 members (0.16%).

DID Analysis Result

Table 2 exhibits the empirical results before and after the COVID-19 pandemic comparing the travel expenditure covered by the treatment group (TE > 0). The model result reveals that the DID estimator is negative and statistically significantly linked with the outcome variable, that is, tourist spending. The average tourist expenditure dropped by ₹747.67 in comparison to the pre-COVID-19 year. The tourism expenditures in rural (Table 3) and urban (Table 4) areas have decreased by ₹1,179.43 and ₹691.35, respectively. The reduction in rural areas is greater than that in urban areas, which could be attributable to a lack of safe transport amenities and increased COVID-19 spread. The imposition of a national lockdown, travel bans, social isolation, etc., has had a significant and immediate impact on unemployment (Bartik et al., 2020; Dreger & Gros, 2021; Parvathamma, 2020), income loss (Varzakas & Metaxas, 2024; Wang et al., 2022), and wealth, directly influencing demand and consumption (Coibion et al., 2020). As a result, people started to avoid

Table 2. DID Analysis Result.

Groups	Before	After	Observations in the Model	
Control	52,183	39,705	91,888	
Treated	4,285	1,505	5,790	
Total	56,468	41,210	97,678	
Outcome Variables	TE	Std Err.	|t|	P>|t|
Before COVID-19				
Control (C)	54.816 (β_0)			
Treated (T)	2,279.131 (β_{0+} β_2)			
Diff (T − C)	2,224.316 (β_2)	14.358	154.92	.000***
After COVID-19				
Control (C)	59.696 (β_{0+} β_1)			
Treated (T)	1,536.344 (β_{0+} β_{1+} β_{2+} β_3)			
Diff (T − C)	1,476.648 (β_{2+} β_3)	23.627	62.50	.000***
Diff-in-diff (DID)	−747.667 (β_3)	27.570	27.12	.000***

Notes: *R*-square: 0.27. Means and standard errors are estimated by linear regression.Inference: ***p < .01; **p < .05; *p < .1.

Table 3. DID Analysis Result for Rural.

Groups	Before	After	Observations in the Model	
Control	17,614	11,712	29,326	
Treated	707	206	913	
Total	18,321	11,918	30,239	
Outcome Variables	TE	Std Err.	$\|t\|$	$P>\|t\|$
Before COVID-19				
Control (C)	19.34 (β_0)			
Treated (T)	1,923.26 (β_{0+} β_2)			
Diff (T − C)	1,903.92 (β_2)	18.67	101.96	.000***
After COVID-19				
Control (C)	22.78 (β_{0+} β_1)			
Treated (T)	746.27 (β_{0+} β_{1+} β_{2+} β_3)			
Diff (T − C)	723.49 (β_{2+} β_3)	34.140	21.19	.000***
Diff-in-diff (DID)	**−1,179.43** (β_3)	38.895	30.35	.000***

Notes: *R*-square: 0.27.Means and standard errors are estimated by linear regression.Inference: ***p < .01; **p < .05; *p < .1.

Table 4. DID Analysis Result for Urban.

Groups	Before	After	Observations in the Model	
Control	34,569	27,993	62,562	
Treated	3,578	1,299	4,877	
Total	38,147	29,292	67,439	
Outcome Variable	TE	Std Err.	$\|t\|$	$P>\|t\|$
Before COVID-19				
Control	−21.02 (β_0)			
Treated	2,275.62 (β_{0+} β_2)			
Diff (T − C)	2,296.65 (β_2)	18.140	126.61	.000***
After COVID-19				
Control	−18.09 (β_{0+} β_1)			
Treated	1,587.20 (β_{0+} β_{1+} β_{2+} β_3)			
Diff (T − C)	1,605.29 (β_{2+} β_3)	29.26	54.87	.000***
Diff-in-diff	**−691.35** (β_3)	34.37	20.11	.000***

Notes: *R*-square: 0.23. Means and standard errors are estimated by linear regression.Inference: ***p < .01; **p < .05; *p < .1.

or postpone travel plans (Foo et al., 2021; Immordino et al., 2022; Rutynskyi & Kushniruk, 2020; Singh et al., 2021; Uglis et al., 2022; Uğur & Akbıyık, 2020), leading to a large fall in consumption, particularly in travel.

Previous pandemics like the swine flu, Ebola, SARS, and MERS also demonstrated a significant negative impact on domestic tourism demand by causing a decline in visitor arrivals (Cahyanto et al., 2016; Kuo et al., 2008; Page et al., 2012; Shi & Li, 2017). This ultimately resulted in less tourism spending, as found in our results and supported by many existing studies (Allan et al., 2022; Baños-Pino et al., 2023; Ren et al., 2024; Varzakas & Metaxas, 2024). Again, if some people want to travel cautiously even after the restrictions are loosened, they will shorten their stay to reduce the risk of illness and allocate their daily expenditure to other necessary categories (Baños-Pino et al., 2023). Even people are induced to reduce several consumptions and raise their savings, keeping in mind the future prospects of income and employment, and the government's ability to resolve these issues due to the uncertain length of the pandemic (Immordino et al., 2022).

Table 5 indicates that location and gender have a negative and insignificant association with tourism expenditure. Few studies found that women are the

Table 5. DID Analysis Result with OLS Estimation.

Control Variables	Coefficients	*P* Values
Treated (β_1)	2,224.31	.000***
Time (β_2)	4.89	.41
Treated × Time (β_3)	−747.667	.000***
Female dominated	−5.489	.431
Balanced gender	−5.934	.459
Urban	−10.139	.172
Grownup dominated	24.34	.003**
Balanced age	2.496	.789
Salaried employees	70.934	.000***
Farmers	−2.60	.808
Small traders and wage earners	7.23	.409
Miscellaneous	−37.114	.001**
Moderately educated	−80.201	.000***
Least educated	−90.478	.000***
HH size 6–10 members	37.710	.000***
HH size >10	−17.889	.806
Constant	33.283	.013**
Observations	97,678	–
R-squared	0.2325	
Adj. *R*-squared	0.2324	–
Dependent variable: Total_ TE_{ht}		
Estimation method: OLS		

Notes: ***$p < .01$; **$p < .05$; *$p < .1$.

Reference groups: Male-dominated, rural, young dominated, business personnel, better educated HH, and HH size from one to five.

most vulnerable to the COVID-19 effect, and they also avoid traveling (Cahyanto et al., 2016) due to financial constraints (Sahoo et al., 2022), along with higher contagion risk (Cortes & Forsythe, 2020; Park & Reisinger, 2010; Varshney et al., 2020). But the existing studies of the pre-COVID period indicate that women spend more on tourism in comparison to men (Brida & Scuderi, 2013; Marcussen, 2011; Wang & Davidson, 2010). Out of all age groups, only the grownups dominated (26–60) positively and significantly influenced tourism spending. Wang and Xia (2021) found that older individuals are more likely to travel and spend more money on leisure during this pandemic. But during the pre-COVID period, Dardis et al. (1981) found a negative association between the age group of 15 and 64 and tourism expenditure, as they prefer to spend more on education, health, and children. Few studies show that younger people are more psychologically influenced and avoid traveling (Varshney et al., 2020). Even Cai (1999) and Lee (2001) noted a statistically insignificant relationship between age and tour spending. In the occupation group, only salaried employees (positive) and the miscellaneous group (negative) exhibit significant coefficients. Salaried workers may, with an income certainty, plan for a holiday after the relaxation of the restrictions and positively contribute to tourist spending. In contrast, miscellaneous groups with uncertain jobs and little or no income may seek to store some money for future cautious consumption and may avoid fancy consumption like a vacation. The other two categories—farmers and small traders and daily wage earners—have an insignificant association. Even Brida and Scuderi (2013) stated that occupation as a regressor is sparingly used in applied micro-econometrics determinants of tourism behavior, and the results were mostly insignificant.

Compared to households with highly educated members, those with moderately and least educated members have a significant but negative impact on tourism expenditure. Previous studies have also shown that visitor education is positively correlated with tourist spending, indicating that those with better education tend to travel more due to better-paying jobs (Dardis et al.,1981; Nicolau & Más, 2005; Wu et al., 2013). On the other hand, people with lower levels of education are most affected by reduced hiring rates and higher job losses and pay cuts, which directly impact their spending choices, especially on travel and entertainment (Cortes & Forsythe, 2020). The household size of 6–10 members indicates a positive statistically significant relationship with tourism expenditure. However, the literature suggests that an increase in the number of members leads to stronger contagion fears (Immordino et al., 2022), reducing the likelihood of travel. Our results found that, if the household size exceeds 10, there is a negative and insignificant relationship with tourism expenditure (Fleischer & Rivlin, 2009; Jang & Ham, 2009; Lin et al., 2021). Nevertheless, people may still plan a vacation with all safety precautions for stress relief and to improve mental health, which could positively contribute to tourist consumption.

Table 6 presents an analysis of household control variables and their impact on tourism consumption in rural and urban areas in the presence of COVID-19. The results show that the influence of the pandemic on tour spending is similar to the

Table 6. DID Analysis Result with OLS Estimation for Rural and Urban.

	Rural		Urban	
Control Variables	Coefficients	*P* Values	Coefficients	*P* Values
Treated (β_1)	1,903.92	.000 ***	2,291.231	.000***
Time (β_2)	3.42	.556	5.85	.48
Treated × Time (β_3)	−1,180.423	.000 ***	−693.513	.000***
Female dominated	−2.01	.766	−6.181	.521
Balanced gender	6.87	.386	−11.235	.305
Grownup dominated	12.45	.096*	30.942	.008***
Balanced age	2.91	.736	3.721	.78
Salaried employees	34.67	.002***	74.992	.000***
Farmers	−18.87	.038**	−2.488	.919
Small traders and wage earners	−10.94	.27	10.595	.364
Miscellaneous	−29.83	.027**	−43.862	.002***
Moderately educated	−19.16	.022**	−95.419	.000***
Least educated	−29.13	.000***	−110.734	.000***
HH size 6–10 members	3.667	.646	59.754	.000***
HH size >10	−29.70	.612	−7.24	.949
Constant	19.34	.139	21.482	.172
Observations	30,239	–	67,439	–
R-squared	0.2699		0.2295	
Adj. *R*-squared	0.2696	–	0.2293	–
Dependent variable: TE_Rural (for rural HHs) TE_Urban (for urban HHs).				
Estimation method: OLS				

Notes: ***$p < .01$; **$p < .05$; *$p < .1$.

Reference groups: Male dominated, young dominated, business personnel, better educated HH, and HH size from one to five.

national level when considering all the variables in the urban area. However, there are some exceptions in the rural region. In rural areas, variables such as balanced gender (positive), small traders and wage earners (negative, insignificant), farmers (significant), and household size of 6–10 members (insignificant) show different tour consumption patterns compared to the urban and national levels. Upon examining different occupation types, it was discovered that the group of farmers has a significant negative impact on tourism spending in rural areas. Even before the pandemic, the financial situation of Indian farmers was precarious due to their low income, with the majority of their income being taken by intermediaries, dealers, and, in some cases, landowners. Unfortunately, due to COVID-19 restrictions, their situation has only worsened.

Robustness Check 1: Two-sample t-test with Equal Variances

We check the robustness of the DID model using a *t*-test. (Table 7) The result states that the mean of TE for the pre-COVID-19 period was ₹2,243.63, while it declined to ₹1,497.39 in the post-COVID-19 period. So the result rejected the null hypothesis that the TE of both the years are the same ($\mu_1 = \mu_{2)}$ and accepted the alternative hypothesis of $\mu_1 \neq \mu_{2,}$ that is, it indicates that there is a difference in tourism expenditure of the sample households in India. The *t*-test results support the DID findings, which show that COVID-19 has a significant negative influence on tourism spending.

We also check for the robustness of the rural and urban samples. The *t*-test results suggest a drop in tourism consumption in both rural (₹1,186.20) and urban (₹689.42) areas, which is to be expected given the prevalence of the COVID-19 pandemic and its attendant constraints (lockdown, social distancing, curfew, and travel halt).

Robustness Check 2: PSM

Both control and treated (Table 8) groups include tourism expenditure of the pre- and post- COVID-19 periods, respectively. Here, we used five types of the most commonly used PSM tests, where the results of all the matching algorithms are statistically significant and are parallel to the result of DID analysis as well as the

Table 7. Mean Difference in TE.

Groups	Observations	Mean	Std Err	*SD*
Control (Pre-COVID-19 Period)	4,285	2,243.63	64.20	4,202.7
Treatment (post-COVID-19 period)	1,505	1,497.39	38.41	14,902
All	5,790	2,049.67	48.74129	3,708.8
Mean difference	–	746.2359	110.7061	–
		t-stat = 6.7407***		

Table 8. Average Treatment Effect of COVID-19 on Tourism Expenditure.

Matching Algorithms	MTE of Treated	MTE of Control	Difference	SE	*T*-stat
k-Nearest neighbors matching	1,497.39	2,036.67	−539.28	249.27	−2.16**
Radius matching	1,497.39	2,163.16	−665.77	78.79	−8.45***
Kernel matching	1,497.39	2,189.28	−691.89	79.85	−8.66***
Local linear regression matching	1,497.39	2,182.56	−685.17	79.87	−8.58***
Mahalanobis matching	1,522.10	2,136.82	−614.72	282.84**	−2.17**
T-stat: 1.72−1.96*, 1.96−2.18**, > 2.18***					

Note: MTE: Mean tourism expenditure.

t-test, indicating a negative difference between the control and treated groups. In other words, people spent less during the COVID-19 pandemic period on tourism than they did before the COVID-19 situation.

We performed several robustness tests to double-check the results. Specifically, we reestimate the baseline model with a two-sample *t*-test and PSM. Estimated responses are found to be qualitatively similar to the baseline results. Moreover, we used the PSM test for estimating the tourism spending pattern in rural and urban households in India. This also suggests that the baseline results are qualitatively robust to different estimation settings.

Concluding Observations

In regard to analyzing the impact of the COVID-19 outbreak on tourism-spending behavior in Indian households, our findings indicate a significant decrease in tourism expenditure as a result of the outbreak. The one-way *t*-test and PSM result also validated the DID results as a robustness check. While the outbreak has affected travel spending in both urban and rural areas, rural travel expenses have been more negatively impacted. During the COVID-19 pandemic, the DID results indicated a 34% decline in tour expenditure compared to the pre-COVID-19 period, with a 30% decrease in urban spending and a significant 62% reduction in rural tour spending. Though we are all aware of the reasons behind it, we should also know that this decline may adversely affect the tourism sector to the highest degree, with overall economic growth, being a source of revenue, employment, and income at the destination as well as for the economy. Moreover, we found that socioeconomic and demographic factors, such as age, education, occupation, and family size, continue to play a significant role in determining the amount of money spent on tourism, regardless of the COVID or pre-COVID situation, while gender appears to be insignificant in the former situation.

The implications of these findings for policymakers in India are significant. The study's results provide policymakers with an insight into the current state of tourism spending in both rural and urban areas, which can help in formulating adequate policies, including marketing and investment strategies for the quick recovery of the most-affected sectors of the tourism industry. Additionally, the findings may help tourism practitioners gain a clear understanding of the current and future effects of the pandemic on the tour and travel sectors. As domestic tourism is a key driver of destination resilience in countries like India, a reduction in tourism expenditure can also affect related industries, such as transportation, food and beverage, and hotel sectors (Zhou et al., 1997). Therefore, policymakers, tourism practitioners, and governments should pay more attention to the severity of the COVID-19 devastation to ensure the gradual recovery of this sector. Reduced household tourism spending can adversely affect the industry's growth, reducing revenue and exacerbating unemployment. Economizing tourism packages with appropriate safety measures can be provided to restore the situation. Additionally, the study finds that the COVID-19 outbreak has more negatively impacted the tourism spending of rural households than urban households in India. Thus, policymakers should consider promoting the employment of rural

labor in the agriculture sector and creating job opportunities for them in urban areas. While the study's findings lack generalizability, similar studies could be conducted for other emerging market economies.

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Article

The Green Signal: Event Study of Stock Reactions to Green Bond Announcements in India

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Abstract

This study explores the short-term reaction of the stock market to announcements of green bond issuance by Indian firms using an event study methodology. Drawing upon signalling theory and supported by a robust dataset of 35 green bond issues from 2015 to 2024, the analysis applies Market Adjusted Returns, Market Model Abnormal Returns, and Risk Adjusted Returns to evaluate abnormal returns over a [–20, +20] trading day window. The findings reveal statistically significant positive abnormal returns immediately following green bond announcements, particularly on days +2, +8 and +12, suggesting investor optimism and perceived commitment to sustainability. However, both pre- and post-event windows exhibit negative returns, which imply either information leakage or short-term correction. The research supports the applicability of green bonds as a strategic investment tool but calls for stable ESG integration and transparent certification mechanisms to maintain long-term investor trust.

Keywords

Green bonds, stock market reaction, event study, sustainable finance, ESG, emerging markets, abnormal return, India

Introduction

Global green bond issuance has expanded rapidly over the past decade, with cumulative aligned green bond volume reaching about $3.4 trillion by the end of

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Q3 2024, as governments, corporates and financial institutions increasingly use these instruments to finance climate-aligned projects in areas such as renewable energy, energy efficiency, transport and water infrastructure. This growth reflects strong demand from ESG-focused investors who view green bonds as a way to combine financial returns with environmental impact, and has firmly embedded green bonds within the broader sustainable debt market.

India entered the green bond market in 2015, when Yes Bank issued the country's first labelled green bond to finance renewable energy projects, after which issuance spread to public sector undertakings, commercial banks and non-financial corporates. Supported by SEBI's 2016 guidelines (updated in 2017) and subsequent policy initiatives, India's green and broader GSS+ bond market has grown quickly. By the end of 2024, cumulative aligned green debt originating from India was around $46.6 billion, and total aligned GSS+ volume was about $55.9 billion, with green bonds accounting for roughly four-fifths of this amount. Despite this progress, India's green bond market still represents a small share of global issuance around 1% of cumulative aligned green volume as of the end of 2024 and remains concentrated in low-carbon energy, while sectors such as waste management, water infrastructure and green buildings are comparatively underrepresented.

Table 1 highlights India's position in the global green bond market as of Q3 2024. Despite a cumulative issuance of $25.0 billion, India's share remains modest at approximately 0.7% of the global market. Notable Indian issuers include Yes Bank, Adani Green, State Bank of India and Axis Bank. India has positioned itself as a key player in the green finance landscape among emerging economies. Since the inaugural issuance by Yes Bank in 2015, the green bond market in India has grown significantly. As of December 2021, India's total issuance of Green, Social and Sustainability (GSS) bonds stood at $19.5 billion, of which $18.3 billion was from green bonds (Climate Bonds Initiative, 2021). The growth has been led by non-financial corporates like Adani Green Energy and Renew Power, and financial institutions like Axis Bank and State Bank of India. However, despite this upward trajectory, India ranks only 15th globally in terms of bond market

Table 1. Global and Indian Green Bond Issuance (as of Q3 2024).

Region/ Country	Cumulative Green Bond Issuance (USD Billion)	Share of Global Market (%)	Notable Issuers
Global (Total)	3,400	100	World Bank, Apple, Tesla, etc.
United States	900	~26.5	Apple, Bank of America
China	800	~23.5	ICBC, Bank of China
France	300	~8.8	Government of France
Germany	250	~7.4	KfW, Government Bonds
India	25	~0.7	Yes Bank, Adani Green, SBI, Axis Bank

Source: Climate Bonds Initiative (2025).

size, indicating substantial untapped potential (Dwivedi, 2024). A key impetus behind the growth of green bonds in India has been the introduction of enabling policy frameworks. The Securities and Exchange Board of India (SEBI) issued guidelines for green bonds in 2016 and updated them in 2017 to align with the Green Bond Principles developed by the International Capital Market Association. The guidelines focused on four key elements: use of proceeds, project selection and evaluation, management of proceeds and reporting. The new SEBI regulations improved transparency and accountability, and thus investor confidence (International Capital Market Association, 2017, 2018; Verma & Agarwal, 2020). Figure 1 shows green bond issuance in India rising steadily from 2015 to 2023, reflecting growing investor interest in sustainable finance. Issuance grew from $1.1 billion in 2015 to $12.3 billion in 2023 (data extracted from Bloomberg by authors). Surprisingly, the mean coupon rate has exhibited a steady downtrend, indicating enhanced credit confidence and a narrowing 'greenium' the yield premium investors pay for labelled green bonds, though India's average coupon of 7.1% remains higher than global levels. Even with a slight decline in 2024, the forecasted recovery in 2025 signals strong market potential.

In addition, increasing sensitivity to ESG concerns and India's global climate pledges such as the Paris Agreement and the United Nations Sustainable Development Goals have also augmented the significance of green bonds. India's goal of net-zero carbon emissions by 2070 and its commitment to becoming a 500 GW renewable energy producer by 2030 require unlocking enormous financial resources. Green bonds are considered a critical tool for raising finance for the transition towards a low-carbon, climate-resilient economy (Abhilash et al., 2023; Agarwal & Singh, 2021).

Despite these promising advances, the Indian green bond market still confronts substantial structural, operational and market development challenges that

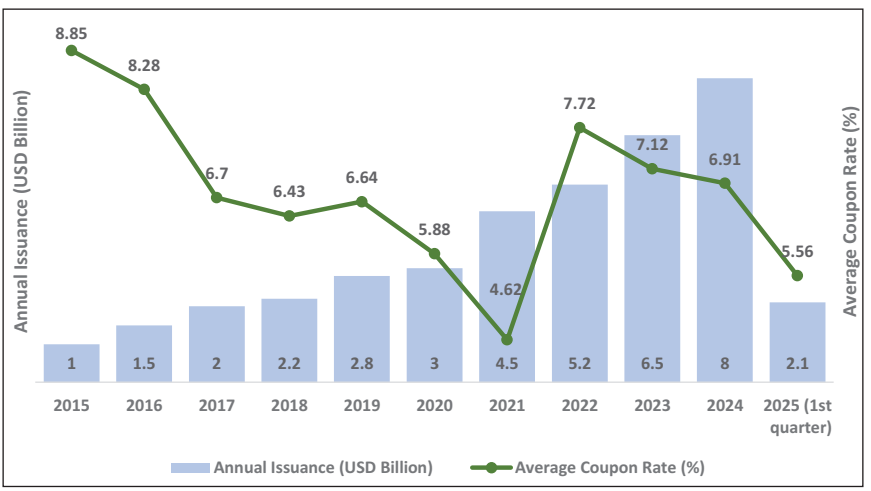


Figure 1. Green Bond Issuance and Average Coupon Rate in India.

Source: Data extracted from Bloomberg.

constrain its full potential. Key hurdles include the absence of a comprehensive national green taxonomy a standardised classification system for environmentally sustainable economic activities which creates uncertainty for investors about what truly qualifies as 'green' (unlike the EU Taxonomy or other mature frameworks). High transaction costs associated with certification, legal structuring and international listings further deter smaller issuers, while limited financial incentives (such as tax breaks or subsidies for green projects) fail to sufficiently offset these expenses. Investor awareness remains narrow, particularly among domestic retail and institutional players who prioritise traditional fixed-income assets over sustainable ones (Abhilash et al., 2023).

A concrete illustration of these frictions is India's average green bond coupon rate of 7.1%, which significantly exceeds the global average of approximately 3%–4% observed in more developed markets like the USA and Europe. This elevated pricing reflects higher perceived risks, shallower liquidity, and less mature ESG integration, even as it attracts yield-seeking foreign investors (Dwivedi, 2024). Moreover, green bond proceeds remain heavily concentrated in renewable energy (over 80% allocation), leaving critical sectors like waste management, green buildings, urban transport, and water infrastructure chronically underfunded despite India's pressing sustainability needs.

The financial impact of green bond issuance particularly its effect on stock performance remains an area of ongoing academic inquiry. Theoretically, green bonds are posited to enhance firm value through signalling theory (Spence, 1973), as their issuance conveys a credible commitment to sustainability. This can lead to reputational gains, improved stakeholder trust, and eventually higher valuations. Conversely, if investors suspect greenwashing or perceive limited material impact from the projects financed, market reactions may be muted or even negative (Tang & Zhang, 2020; Wang et al., 2021).

Empirical evidence from global studies is mixed; Flammer (2021) established that U.S. corporate green bond announcements generate positive abnormal returns, consistent with the signalling hypothesis. However, Fatica & Panzica (2021) identified more complex results in the EU, where the performance of the stock depended on the sector of the issuer and the external certification of the bond. Such disparities necessitate country-specific research as the key to interpreting localised investor behaviour and regulatory effects.

Verma and Bansal (2023) examined six Indian companies employing a 21-day event study and reported largely positive cumulative abnormal returns (CAR) after the announcement, with Yes Bank appreciating by 5.3%, suggesting a positive investor reaction. Based on this, the current research seeks to investigate whether green bond issuance in India serves as a good market signal (Flammer, 2021), provides short- or long-term stock performance advantages (Fatica & Panzica, 2021), differs across industries (Tang & Zhang, 2020), and is affected by external certifications like Climate Bonds Certification or Second Party Opinions (Agarwal & Singh, 2021; Climate Bonds Initiative, 2021). These questions have real-world implications for many stakeholders. For corporates, a positive share price reaction may encourage further engagement with sustainable finance. For investors, knowledge of share price behaviour after green bond issuance can

shape portfolio strategy. For regulators and policymakers, it can inform attempts to create more effective frameworks to promote both environmental sustainability and market efficiency.

Against this backdrop, this research seeks to conduct an in-depth analysis of stock market reaction to green bond issuance in India. Using an event study approach, backed by sentiment analysis and financial performance measures, the research will examine whether green bonds are value-enhancing instruments in the Indian capital market. It will also investigate if India's green bond ecosystem is developing in a way that enables financial performance along with climate action. This study extends prior Indian evidence by employing a larger multi-sector sample and multiple abnormal return models, thereby offering more robust and generalisable insights into investor reactions.

Literature Review

The changing world of sustainable finance has placed green bonds at the centre of research into climate-themed investments and market performance. As an emerging asset class, green bonds are being highlighted by academia and industry for their potential to align financial returns with environmental goals. Researchers have grown increasingly interested in investigating the impact of green bond issuances on stock market reactions, stock prices, firm valuation, and investor sentiment across developed and emerging markets. Such studies provide the foundation for assessing the effectiveness of green bonds not just as environmental instruments but also as signalling financial instruments.

Theoretical Framework

Green bonds and their impact on stock market performance rest on several core financial and sustainability theories, each generating distinct testable predictions for this study.

Signalling theory (Spence, 1973) posits that green bond issuance serves as a credible signal of a firm's commitment to sustainability, reducing information asymmetry between managers and investors. This should manifest as positive abnormal returns concentrated around the announcement date, as markets reward firms perceived to be genuinely pursuing environmental goals.

Stakeholder theory suggests that addressing environmental concerns strengthens relationships with diverse stakeholders investors, customers, regulators and communities yielding reputational capital and operational efficiencies over time. This predicts longer-term performance improvements and sustained reputational benefits beyond the immediate announcement effect.

Finally, the efficient market hypothesis (EMH) in its semi-strong form underpins the event study methodology, assuming that stock prices rapidly incorporate all publicly available information, including green bond announcements. Consequently, any abnormal returns should be short-lived and concentrated around the event date, with prices reverting to fundamentals thereafter.

Together, these theories provide a cohesive framework for the hypotheses. Signalling theory predicts immediate positive market reactions to green bond announcements, while stakeholder theory anticipates longer-term benefits from enhanced reputation and stakeholder alignment. The EMH ensures that any observed abnormal returns will be concentrated around the event window, guiding the event study methodology and window selection in this analysis. This integrated theoretical lens motivates testing whether green bond issuance generates significant short-term abnormal returns (H_1) in the Indian context, with potential implications for sustained value creation.

Empirical Insights and Global Evidence

Empirical research on green bond announcements offers evidence of positive reactions in many developed markets. Flammer (2021) documents significantly positive abnormal stock returns around corporate green bond announcements in the USA, attributing this to improved environmental reputation and investor confidence. Tang and Zhang (2020) similarly show that shareholders often interpret green bond issuances as credible signals of a firm's long-term sustainability orientation, leading to short-term wealth gains. Roslen et al. (2017) also report positive shareholder wealth effects across several countries, particularly where disclosure standards and green finance ecosystems are relatively mature.

However, a growing body of work points to mixed or conditional reactions. Mocanu et al. (2021) find that while short-term stock price responses to sustainability bond issuances are generally positive, longer-term effects are more muted and highly sensitive to market maturity and regulatory context. Antoniuk and Leirvik (2021) show that transition climate risks can dampen or offset the advantages of green bonds, especially for firms with substantial exposure to carbon-intensive activities. Kazokas (2024) reports heterogeneity in market reactions among European issuers, with responses varying systematically by firm size, industry and prevailing investor sentiment, suggesting that not all green bond announcements are rewarded equally.

A third stream emphasizes the role of certification and credibility in shaping market responses. Wu (2022) argues that green bonds are not necessarily priced below traditional bonds in primary or secondary markets, challenging the assumption of a universal 'greenium' in bond yields and indicating that investors scrutinise issue quality and issuer fundamentals rather than paying an automatic price premium. This has implications for equity reactions as well: If investors do not systematically reward green bonds through lower yields, any stock price response is more likely to depend on perceived credibility, transparency of use-of-proceeds and alignment with broader ESG strategies rather than the label alone. Boschetti and Baldini (2017) further suggest that the success of a green bond, in both bond and equity markets, hinges on the perceived genuineness of the issuer's environmental claims and the strength of external verification or second-party opinions. Together, this literature indicates that while positive abnormal returns are common, they are neither universal nor uniform

and depend strongly on sector, certification and the institutional quality of the underlying market.

Indian and Emerging Market Context

Research on green bonds in India and other emerging markets remains limited but is steadily growing, highlighting both opportunities and unique challenges. Verma and Bansal (2023) conducted one of the earliest event studies specific to the Indian market, analysing six green bond issuers over a 21-day event window and reporting overall positive cumulative abnormal returns (CAR). For instance, Yes Bank experienced a 5.3% CAR, reflecting favourable investor sentiment toward credible sustainability commitments (exact figures confirmed from published study). Prakash and Sethi (2021) emphasise the importance of supportive policy frameworks and favourable macroeconomic conditions in enhancing the effectiveness of green bonds across Asia, while Bansal et al. (2023) identify persistent challenges in India, including high coupon rates, limited investor awareness, and insufficient sectoral diversification. Verma and Agarwal (2020) criticise the heavy concentration of green bond proceeds in renewable energy and advocate for broader allocation to underserved areas, such as water infrastructure and waste management. Glavas (2018, 2020) demonstrates that regulatory clarity significantly bolsters market confidence, underscoring the need for standardised green bond guidelines. Ahmed et al. (2024) argue that green bonds can effectively bridge corporate finance with the UN Sustainable Development Goals, provided transparency and third-party certifications are robustly implemented.

This study extends Verma and Bansal (2023) in four key ways: (a) a larger sample of 35 green bonds from 14 listed firms (vs. their 6 firms), (b) a longer time horizon spanning 2015–2024 to capture market evolution, (c) multiple robustness models (MAR, MKAR, RAR) beyond a single specification and (d) wider sectoral coverage including banking, energy, and infrastructure for more comprehensive insights.

Emerging markets like India present distinct dynamics compared to developed markets: weaker disclosure standards, higher funding costs due to sovereign risk premiums and thinner market liquidity can lead to more volatile and delayed investor reactions in event studies. These factors may amplify the role of signalling through green bonds while potentially muting long-term effects due to macroeconomic noise and limited ESG data integration.

Green Bonds During Crises and Market Spillovers

The resilience of green bonds under economic stress and their integration into global portfolios have also attracted research attention. Sisodia et al. (2022) and Yi et al. (2021) demonstrate that green bonds exhibited relative stability during the COVID-19 crisis, displaying hedging qualities against equity market volatility. Guo and Zhou (2021) confirm this pattern in US and Chinese markets, while Dong et al. (2023) note that green bonds show lower correlation with conventional equities, enhancing portfolio diversification benefits. Mensi et al. (2023) and Tiwari et al. (2023) document increasing financial spillovers between green

bonds, global equity markets, and even Islamic financial assets, signalling their growing systemic integration.

These findings matter for equity event studies because green bonds' demonstrated diversification and resilience qualities may influence investors' stock price responses at issuance, particularly for firms targeting ESG-oriented portfolios that value stability during uncertainty.

Methodological Approaches and Sectoral Trends

Event study methodology is the most widely practised method of green bond impact evaluation, as articulated by Ederington et al. (2015). It is often possible to employ a short event window to capture swift investor reaction, but according to researchers such as Makpotche et al. (2024) and Bhutta et al. (2022), longer-horizon stock performance also needs to be considered. Paul and Solli (2021) extend green bond research into the shipping sector, whereas Zhou and Cui (2019) find that green bond issuance leads to better corporate social responsibility (CSR) rankings and stakeholder relationships. Although the literature is growing, gaps remain. Most current research focuses on developed markets, with emerging markets such as India remaining underrepresented. In addition, while positive short-term market responses are frequently reported, the long-term financial and ESG performance of green bond issuers is not yet adequately investigated. Furthermore, the impact of external audits and certification quality on investor confidence and bond pricing remains to be determined conclusively.

Research Gaps and Hypotheses

Current literature reveals several critical gaps that this study addresses, particularly in the Indian context. While global studies often report positive short-term market responses, analyses of long-term financial and ESG performance among green bond issuers remain limited. Sectoral distinctions such as differences between banking, energy and infrastructure are rarely explored, despite varying investor perceptions across industries. Additionally, the influence of third-party certification and ESG disclosures on investor sentiment has not been fully examined for emerging markets like India, where disclosure standards and market liquidity differ from developed economies.

To address these gaps, this study tests the following hypotheses using an event study approach with Average Abnormal Returns (AAR) and Cumulative Average Abnormal Returns (CAAR) across multiple event windows:

H_0 (Null Hypothesis): Announcement of green bond issuance does not lead to significant abnormal returns for issuing firms in the Indian stock market.

H_1 (Alternative Hypothesis): Announcement of green bond issuance leads to significant abnormal returns for issuing firms in the Indian stock market.

Subsidiary hypotheses:

H_{1a}: Green bond announcements generate positive abnormal returns in the short-term announcement window [0, +2].

H_{1b}: There are no significant long-term abnormal returns in post-announcement windows [2, +10] and [10, +20].

H_{1c}: Abnormal returns differ significantly across sectors (banking vs. energy vs. infrastructure).

These hypotheses directly test the signalling effect predicted by theory, the short-lived nature expected under EMH, and the heterogeneity suggested by sectoral and certification literature, using India's comprehensive green bond dataset from 2015–2024.

Data Collection

This study adopts a systematic approach to data collection in order to investigate the impact of announcements of green bond issuance on the stock price performance of Indian companies. Bloomberg was utilised to compile a comprehensive list of all existing and mature green bonds issued by Indian entities. The initial dataset comprised 99 green bonds, with detailed information extracted for each bond, including issuer name, ticker symbol (ISIN), bond serial number, green bond classification, issuance amount (in USD), ESG classification, issuing country, announcement and issue dates, maturity date, coupon rate, currency, security type and market sector description. To facilitate focused analysis, bonds were grouped into three categories: government entities (29 bonds), listed companies (43 bonds) and non-listed companies (27 bonds). The empirical analysis centred on the 43 bonds issued by listed companies, as these allowed for the evaluation of stock price reactions. After excluding eight bonds issued before the respective companies were publicly listed, the final sample comprised 35 green bonds issued by 14 publicly listed companies, spanning sectors such as banking, energy and infrastructure. Table 2 represents the entire dataset under study. Stock price data were retrieved from Google Finance, covering a window of ±120 trading days around each bond's announcement date. Additionally, daily closing prices of the NIFTY 50 index from 2014 to 2024 were collected to serve as a benchmark for market performance.

Research Methodology

This study employs the event study methodology introduced by Fama et al. (1969) and grounded in the semi-strong form Efficient Market Hypothesis proposed by Fama (1970). It has been extensively used to empirically test corporate events and associated stock market responses (Werner, 2010). This method is based on the semi-strong form of the market efficiency hypothesis, which holds that it is not possible to consistently earn excess returns because all publicly available information is immediately reflected in stock prices. Because of its systematic

Table 2. Green Bond Issuances by Indian Corporations (2015–2024).

	Amounts in ₹ Crore	
Company Name	Amount Issued	Announcement Date
ADANIGREEN	409	27-Feb-2024
ADANIGREEN	363	03-Oct-2019
ADANIGREEN	750	01-Sep-2021
ADANIGREEN	500	30-May-2019
ADANIGREEN	1,552	23-Jan-2024
ADANIGREEN	950	05-Feb-2024
AXISBANK	40	11-Apr-2019
AXISBANK	24,300	27-May-2016
AXISBANK	500	23-May-2016
BAJFINANCE	100	14-Jul-2016
HEROMOTOCO	1,300	15-Feb-2016
HEROMOTOCO	16,974	21-Dec-2016
HEROMOTOCO	500	18-Jan-2016
IDBI	350	23-Nov-2015
IRFC	500	13-Jan-2022
JSWENERGY	707	10-May-2021
NTPC	20,000	03-Aug-2016
PFC	400	28-Nov-2017
PFC	300	06-Sep-2021
RECLTD	450	29-Jun-2017
RECLTD	750	03-Apr-2023
RECLTD	2,700	12-Jan-2024
RECLTD	31,000	12-Jan-2024
RECLTD	500	23-Sep-2024
RECLTD	27,400	12-Jan-2024
RECLTD	40,000	30-May-2024
SBIN	250	22-Dec-2023
SBIN	650	19-Sep-2018
SBIN	50	09-Jul-2018
SBIN	100	26-Mar-2020
TORNTPOWER	40,000	30-May-2022
WABAG	1,000	03-Jul-2023
YESBANK	10,000	16-Feb-2015
YESBANK	3,150	05-Aug-2015
YESBANK	3,300	29-Dec-2016

Source: Data extracted from Bloomberg.

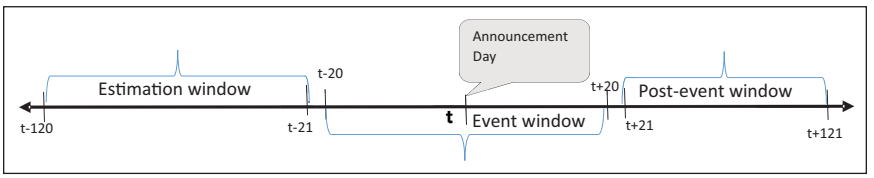


Figure 2. Timeline of the Study.

framework, this method has become more popular among researchers as a valid analytical tool. It involves comparing market performance before and after a significant event and evaluating influential variables such as trading volumes and return volatility (Khotari & Warner, 2006).

As shown in Figure 2, the timeline is divided into an estimation period (days –120 to –21 relative to the green bond issuance date) and an event window (±20 days around the issuance date). Daily stock returns during the estimation period are used to calculate the mean return for each firm using a logarithmic return method. Abnormal returns are then determined within the event window using the mean-adjusted returns model. Abnormal returns after the event may suggest market inefficiency, while abnormal returns before could indicate insider trading:

$$\mathrm{ARi}t = \mathrm{Ri}t - \mathrm{Ri}j,$$

Where ARt represents the abnormal return on a specific day, Rij is the mean return on the stock during the estimation period, and Rit denotes the actual log return of the stock. The daily log return was determined using the formula:

$$\mathrm{Ri}t = \ln(\mathrm{Pi}t / (\mathrm{Pi}t - 1)).$$

where Pit and (Pit – 1) indicate the stock price on days t and (t-1), respectively. The average stock return Rij was calculated using the log return of stock prices.

Further, abnormal returns were calculated using the market-adjusted returns model. Abnormal return $AR_{i,t}$ is calculated by adjusting the actual return with the market return.

$$AR_{i,t} = R_{i,t} - R_{m,t}$$

is the return on the market (NIFTY index return).

$$\mathrm{Rm}t = \ln(\mathrm{Pm}t / (\mathrm{Pm}t - 1)),$$

Moreover, to check the robustness of the model, a risk-adjusted model was used to support the results obtained through the previous models, using the following formula:

$$\mathrm{ARi}t = \mathrm{Ri}t - (\alpha i + \beta i Rm, t)$$

where αi and βi are estimates from a regression of the stock against the market index and ARit and Rit are the same as defined earlier.

The same exercise is done for all companies that have issued green bonds. After that, all abnormal returns are averaged for the same day.

$$AAR = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t}$$

To measure the total impact of announcements of green bond issuance over a specified period, all AARs are added individually to create the CAAR, as represented in the equation below.

$$CAAR(t_1, t_2) = \sum_{t=t_1}^{t=t_2} AAR_{i,t}$$

The CAAR was calculated by adding the abnormal returns for each window under analysis. An event window of 41 days was used for the study, from day –20 to day +20, where day 0 is the date on which green-bond issuance was announced.

To find the statistical significance, the t-test is considered.

$$t = \frac{AAR}{\sigma\text{^aar} / \sqrt{N}}$$

Here, is the standard deviation of the average security return. N is the total number in the sample; here, it is 35. A t-statistic with a p value less than or equal to .05 is significant.

Empirical Results

This section presents the results of the event study analysis on the impact of green bond issuances on stock prices in the Indian capital market. Average Abnormal Returns (AARs) and their corresponding t-statistics were calculated for the [–20, +20] event window using three models: Market Adjusted Returns (MAR), Market Model Abnormal Returns (MKAR), and Risk Adjusted Returns (RAR). These daily observations were further aggregated into CAARs across key event windows to assess overall trends before, during, and after the announcement.

Daily AAR and t-Statistics Analysis

Table 3 presents the AARs and corresponding t-statistics for each day from 20 days before to 20 days after the announcement date.

Pre-Event Window Analysis

In the pre-event window (Day –20 to Day –1), several statistically significant negative MARs and RARs are observed, notably on Day –10 (–0.93%, t = –12.71), Day –11 (–0.67%, t = –9.22), and Day –12 (–0.60%, t = –8.14), indicating investor pessimism or information leakage (Brown & Warner, 1985). However, brief

Table 3. Daily AARs and t-Statistics for Green Bond Announcements ([–20, +20]).

Days	MAR (AAR)	MAR (T)	MKAR (AAR)	MKAR (T)	RAR (AAR)	RAR (T)
–20	–0.34%	–4.67	–0.51%	–6.64	–0.33%	–4.51
–19	0.08%	1.12	0.47%	6.18***	0.09%	1.28
–18	–0.47%	–6.41	–0.12%	–1.63	–0.46%	–6.25
–17	–0.43%	–5.87	0.02%	0.23	–0.42%	–5.71
–16	–0.05%	–0.68	0.03%	0.46	–0.04%	–0.52
–15	0.20%	2.73**	0.36%	4.63***	0.21%	2.90***
–14	–0.12%	–1.60	–0.05%	–0.62	–0.11%	–1.44
–13	–0.17%	–2.35	0.14%	1.87*	–0.16%	–2.19
–12	–0.60%	–8.14	–0.23%	–2.94	–0.58%	–7.98
–11	–0.67%	–9.22	–0.35%	–4.51	–0.66%	–9.06
–10	–0.93%	–12.71	–0.53%	–6.96	–0.92%	–12.55
–9	0.16%	2.17**	0.63%	8.25***	0.17%	2.33**
–8	0.52%	7.16***	0.54%	7.10***	0.54%	7.33***
–7	–0.77%	–10.54	–0.46%	–5.98	–0.76%	–10.38
–6	0.07%	0.96	0.44%	5.71***	0.08%	1.13
–5	–0.05%	–0.66	0.01%	0.15	–0.04%	–0.49
–4	0.53%	7.22***	0.80%	10.49***	0.54%	7.39***
–3	–0.44%	–5.94	–0.63%	–8.26	–0.42%	–5.78
–2	–0.47%	–6.46	0.08%	1.02	–0.46%	–6.30
–1	–0.16%	–2.16	0.11%	1.40	–0.15%	–2.00
0	0.12%	1.66	–0.14%	–1.89	0.13%	1.82*
1	0.10%	1.31	–0.15%	–1.94	0.11%	1.47
2	0.24%	3.23***	0.37%	4.84***	0.25%	3.39***
3	–0.54%	–7.33	–0.24%	–3.07	–0.52%	–7.17
4	0.03%	0.42	0.04%	0.50	0.04%	0.58
5	–0.41%	–5.67	–0.18%	–2.31	–0.40%	–5.51
6	0.07%	0.99	0.50%	6.51***	0.08%	1.15
7	–0.07%	–1.00	–0.14%	–1.81	–0.06%	–0.84
8	0.38%	5.20***	0.57%	7.45***	0.39%	5.36***
9	–0.20%	–2.66	–0.19%	–2.46	–0.18%	–2.50
10	–0.25%	–3.38	0.04%	0.51	–0.24%	–3.22
11	0.02%	0.21	0.47%	6.16***	0.03%	0.38
12	0.26%	3.60***	0.63%	8.18***	0.28%	3.77***
13	–0.90%	–12.31	–0.80%	–10.43	–0.89%	–12.16
14	–0.58%	–7.88	–0.19%	–2.45	–0.56%	–7.72
15	0.09%	1.22	0.27%	3.57***	0.10%	1.38
16	–0.29%	–3.97	–0.38%	–4.96	–0.28%	–3.81

(Table 3 continued)

(Table 3 continued)

Days	MAR (AAR)	MAR (T)	MKAR (AAR)	MKAR (T)	RAR (AAR)	RAR (T)
17	–0.26%	–3.61	–0.15%	–1.93	–0.25%	–3.45
18	–0.57%	–7.74	–0.16%	–2.04	–0.56%	–7.59
19	–0.26%	–3.49	–0.13%	–1.72	–0.24%	–3.33
20	–0.05%	–0.62	–0.08%	–0.98	–0.03%	–0.46

Source: Authors' own compilation.

Notes: *, **, *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

positive spikes on Day –8 (0.52%, $t = 7.16$***) and Day –4 (0.53%, $t = 7.22$***) indicate some optimistic speculation ahead of the announcement. MKAR also exhibits mixed behaviour during this period, implying uncertain investor expectations and market speculation prior to the official green bond announcement. The results indicate significant negative abnormal returns in the pre-announcement period under MAR and RAR models, suggesting potential market anticipation, adverse firm-specific conditions, or gradual information diffusion before formal disclosure.

On the announcement date, abnormal returns are modest and largely insignificant, indicating that markets may partially anticipate the information.

Event Day (Day 0)

On the announcement day, a slight positive MAR of 0.12% ($t = 1.66$) is recorded, while RAR rises modestly to 0.13% ($t = 1.82$*), indicating a short-term market endorsement of green bond announcements (Flammer, 2021). The insignificant MKAR (–0.14%, $t = –1.89$) supports the observation that markets may have already absorbed the information or remained cautiously neutral.

Post-Event Window Analysis

The post-event window (Day +1 to Day +20) begins with short-term positive returns, especially on Day +2 (MAR = 0.24%, $t = 3.23$***), Day +8 (MAR = 0.38%, $t = 5.20$***), and Day +12 (MAR = 0.26%, $t = 3.60$***). These findings imply a delayed recognition of the strategic value of green bond issuance by investors. However, this is followed by sharp corrections, such as Day +13 (–0.90%, $t = –12.31$) and Day +14 (–0.58%, $t = –7.88$), signalling either profit-taking behaviour or market doubts about the long-term financial implications of such initiatives.

Risk-Adjusted Insights

RAR trends closely align with MAR, confirming that the observed abnormal returns are not substantially influenced by changes in systematic risk. Notably, statistically significant RARs post-event reaffirm that investor sentiment

Table 4. Cumulative Average Abnormal Returns for Selected Event Windows.

Event Window	MAR	T Score	MKAR	T Score	RAR	T Score
{–20, –10}	–0.035	–24.02***	–0.0076	–1.05	–0.0337	–23.80***
{–10, –1}	–0.0153	–10.52***	0.0099	1.36	–0.0141	–9.99***
{0, 2}	0.0045	3.11***	0.0008	0.11	0.0049	3.46***
{2, 10}	–0.0075	–5.13***	0.0078	1.07	–0.0064	–4.53***
{10, 20}	–0.0278	–19.09***	–0.0047	–0.64	–0.0265	–18.72***

Source: Compiled by authors.

Note: *, **, ***denote statistical significance at 10%, 5%, and 1% levels, respectively.

momentarily favours green bond announcements, although this impact is not sustained in the long run.

Cumulative Average Abnormal Returns Analysis

To gain further insights, the AARs were aggregated over selected event windows. Table 4 presents the CAARs and associated *t*-values for the MAR, MKAR, and RAR models.

Pre-Announcement Periods ([–20, –10] and [–10, –1])

The CAARs for both pre-announcement windows are significantly negative under the MAR and RAR models, suggesting that the market possibly held pessimistic views or experienced uncertainty in the lead-up to the green bond announcements. For instance, the MAR CAAR in the [–20, –10] window is –3.5% with a highly significant *t*-statistic of –24.02. This may reflect broader market concerns or sector-specific weaknesses during that time.

Announcement Window ([0, 2])

A clear positive reaction is observed in the short-term announcement window. The MAR and RAR models show statistically significant positive CAARs (0.45% and 0.49%, respectively) with *t*-statistics above 3, indicating that investors react positively to green bond announcements. This is consistent with signalling theory, where the issuance of green bonds sends a positive message about the firm's commitment to sustainable practices, thus enhancing investor confidence (Flammer, 2021).

Post-Announcement Windows ([2, 10] and [10, 20])

However, the post-event window beyond Day +10 reveals significant negative CAARs, suggesting that initial optimism dissipates and prices revert toward fundamentals. The CAARs for these windows go negative again, particularly under the MAR and RAR specifications. For instance, the MAR CAAR for the [10, 20] window is –2.78% (t = –19.09), implying that the early market optimism is

fleeting and might be followed by profit-taking or correction behaviour. This trend is in line with findings from earlier research that environmental cues are likely to make a stronger, shorter-term impact and can lose influence if there is a lack of follow-up or underlying change (Tang & Zhang, 2020).

Model Comparisons

The MAR and RAR models identify more statistically significant abnormal returns than the MKAR model, which controls for systematic risk based on a regression-based market model. The results are consistent with suggestions by Brown and Warner (1985) and MacKinlay (1997) on employing several models to examine robustness in event studies. The MAR model, although less complex, captures investor sentiment around green bond announcements well in the Indian case.

Conclusions

The research finds that green bond announcements in India trigger considerable short-term positive abnormal returns, indicating that investors perceive them as a sign of a firm's sustainability commitment. This is consistent with signalling theory and prior evidence in developed markets. However, the negative returns before and after the event could indicate market uncertainty or short-term profit-taking. The MAR and RAR models were found to better capture these effects, which supports their application in event studies in emerging markets. Overall, the results validate the hypothesis that green bond announcements have a positive effect on stock prices in the short term.

Managerial Implications and Future Scope

The findings of this study carry significant implications for corporate managers, investors, and policymakers. From a managerial perspective, the issuance of green bonds can serve as a powerful strategic signal of a firm’s environmental commitment, potentially enhancing reputation and attracting ESG-focused investors. The positive short-term stock reactions indicate that timing and transparency in announcements are crucial for maximising market impact. Managers, especially in sectors like waste management, water infrastructure, and green buildings currently underrepresented in green bond allocation can explore this financing tool as a means of diversifying capital sources and aligning with national sustainability goals. Moreover, the importance of third-party certifications and ESG disclosures underscores the need for enhanced communication strategies to mitigate investor scepticism and greenwashing concerns. Looking ahead, future research should delve into the long-term financial and ESG performance of green bond issuers in India, explore sector-specific investor responses, and examine how varying levels of regulatory oversight and external validation influence market

behaviour. Comparative studies across emerging and developed markets could also offer deeper insights into global best practices, thereby helping stakeholders strengthen India's green finance ecosystem.

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Article

Decoding the Dynamics of Financial Well-being via Retirement Planning Behaviour: Insights from Indian IT Sector

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Abstract

To attain the ability of retirement readiness and the morale for eventual security in later years, acquiring financial literacy (FL) is intrinsic, which further leads to financial well-being (FWB). In this context, the present study aims to examine the impact of FL on employees' FWB via the interaction role of retirement planning behaviour (RPB) in the Indian IT sector. A cross-sectional quantitative research design approach was adopted, where an analysis of 352 employees collected through self-administered questionnaires was done using PLS-SEM. The findings highlight significant and positive impacts of FL on employees' FWB, with significant partial mediation of RPB in the FL–FWB association, suggesting that FL has a vital influence on improving the efficiency of retirement perception, thereby posing as an anchor in FWB. Considering the prior available research, very few studies have explored these intricate relationships, and thus, this research would serve as an essential guide for both organisations and policymakers.

Keywords

Financial literacy, financial well-being, retirement planning behaviour, employees, structural equation modelling, empirical

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Introduction

Planning ahead has always been an inextricable element of the diurnal nature of human beings ever since the evolution of the human race. Advanced and dynamic transitions in the phase of globalization and industrialization have put a thrust on the need to be financially prepared from the early stages of life, for which a sense of financial acumen to improve the general well-being (Lusardi & Mitchell, 2007) must be instilled in employees.

For this purpose, the competence of understanding financial concepts by an individual, anticipating their financial journey and acting in response requires them to attain the financial literacy (FL) skill (Taft et al., 2013). Ironically, despite the growing criticalities and complexities of the financial market owing to the instability in the global economy coupled with an increased variety of financial products, prior research has provided evidence that in developing and unaffluent economies, individuals lag behind in their grasping capacity of financial knowledge (Philippas & Avdoulas, 2020b); roughly one third of the world's population comprehends basic financial concepts such as interest rates, inflation and risk diversification (Lusardi, 2019). There is a heightened need to address the vitality and criticality of FL for making wise financial decisions for financial well-being (FWB), which has been focused on in this research paper (Kaur et al., 2022; Lee et al., 2020; Limbu & Sato, 2019; Mitra & De, 2024).

The need for FL becomes all the more critical during the post-retirement phases of an individual, where preparing for changes in one's lifestyle to achieve well-being needs to offset financial constraints (Taylor & Doverspike, 2003). In this context, the study proposes to discuss the critical mediating role of retirement planning behaviour (RPB). In recent decades, RPB has emerged as a concept that is no longer constricted to money motives; rather, it has been discovered as a means to attain FWB and security (Murari & Shukla, 2021). Rising awareness of the abrupt shift from financial aspirations for retirement to spiritual motives to fit into an employee's life cycle has been apparent (Wellfren et al., 2022), making RPB a pivotal catalyst to cascade the effects of life-long accumulated financial understanding to achieve FWB.

To further understand the relationship between the attitudes, intention and behaviour of individuals' post-retirement phases, that is, 'Retirement Planning Behavior', which impact their desire to achieve FWB, the theory of planned behaviour (TPB; Ajzen, 1991) and the future time perspective theory (Percy & Elizabeth, 2011) have been proposed. TPB states that an individual's intention to engage in a particular behaviour is influenced by their positive or negative attitude towards the behaviour, subjective norms and perceived behavioural controls (She et al., 2022), which subsequently shapes the behavioural intention, thus reflecting the individual's perception towards future planning behaviour (Kimiyagahlam et al., 2019).

Likewise, the future time perspective theory, which is a critical predictor and antecedent of future financial planning (Hershey et al., 2010; Kerry, 2018), emphasizes the cognitive ability to analyse both immediate and long-term implications of assigning work in the distant future (Andriessen et al., 2006), thus

highlighting the effects of time on individuals' future actions. Therefore, effective retirement planning requires an understanding of the behavioural perceptions and decision-making tendencies of employees that influence their efforts to optimize financial well-being. This perspective is well supported by the aforementioned theoretical frameworks.

Additionally, researchers have underlined that comprehending the finance philosophy would result in greater oversight in money management skills in both short and long terms (Boisclair et al., 2015; Lusardi, 2019). Advanced FL focuses on market products and services, and indirectly serves as an alternative asset for retirement portfolios (Niu & Zhou, 2018). People's financial knowledge and decision-making abilities, commonly referred to as FL, have a vital influence on their psychological financial perception of the post-retirement life, improving the efficiency to customize a retirement plan and posing as an anchor in their FWB (Mitra & De, 2025).

Rationale of the Study

The study's rationale can be attributed to rising stress among employees due to their financial constraints. Amidst any form of critical financial situation disrupting the economy and people's lives and escalating the cost of living, researchers have found that 8 in 10 employees report worrying about their FWB to varying extents. Moreover, nearly 80% employees believe that stress around FWB negatively affects performance in the workplace, yet they are reluctant to discuss their financial concerns. Also, scholarly work remains scarce in this area to address this heightening issue of employees.

Evidence from countries such as Netherlands, China, Malaysia, Russia and the USA has highlighted the growing importance of FWB arising from FL and enhanced RPB in the context of employees (Agnew et al., 2013; Almenberg et al., 2011; Boisclair et al., 2015; Case & Klapper, 2011; Niu & Zhou, 2018; Van Rooij et al., 2011). However, a large disparity exists in confronting the increasing relevance and need of resolving the FWB problem in India despite the country having the greatest growth rate among the world's dominant economies, particularly among the working human capital (Dutta, 2017). To the best of the researchers' knowledge, Indian economy needs to be explored in this area.

Further, to address this significant gap, employees of the Indian IT sector have been chosen for the study. The reason for selecting the IT sector can be justified in that the stress level experienced in the IT sector is disproportionately higher than that experienced by people working in other businesses, with coping with and managing financial problems taking up a substantial portion of their time (Jha et al., 2024; Mandal & Pal, 2024; Subikshaa & Shoba Jasmin, 2018). Additionally, because of the working circumstances and pressure, most employees are not engaged in their finances (Neha et al., 2022). So specifically, the association between FL and FWB coupled with RPB should be exceptionally significant for this industry (Faezah et al., 2017; Mustafa et al., 2017; Vinmalar, 2018).

To address this existing gap, the study proposes to explore the intricate linkages between FL and FWB with the mediating effect of RPB, where FL could

equip employees with the understanding and abilities essential to engage in adept retirement planning, thereby improving their FWB. Therefore, our study intends to address the following research questions:

RQ1: What is the effect of financial literacy levels on attaining employees' financial well-being?

RQ2: What is the intervention/mediating effect of retirement planning behaviour on the financial literacy–financial well-being relationship?

The novel contribution of the study can be encapsulated as (a) exploring the financial aspect, that is, the FL concept, in the existing literature of FWB of employees, especially in the Indian IT sector; (b) elucidating the intricate financial antecedents of employees' FWB with the illustration of the mediating portrayal of RPB in the FL–FWB relationship; and (c) testing the proposed hypothetical model empirically on account of dearth in prior literature on FWB in the Indian context.

Literature Review and Hypothesis Development

Financial Well-being

A sense of tranquillity, security and calmness from a financial perspective gives way to an individual's FWB. A positive financial perspective leads to enhanced FWB; in response, an increased understanding of FWB has ramifications for individuals, society and organizations (Brüggen et al., 2017) as they accomplish their basic financial demands (Dzogbenuku et al., 2022). Conversely, the oversight of FWB may induce financial anxiety, which can escalate an employee's psychological and emotional concerns. Therefore, FWB boosts living standards, alleviating risks of dire financial concerns.

The achievement of self-satisfaction with one's current financial situation, the assurance of covering everyday living expenses and emergency costs, the financial flexibility to pursue one's interests and the confidence in one's future retirement, empowering to experience financial contentment, is what FWB is all about (CFPB, 2015; Mahdzan et al., 2020). FWB can be enhanced with a better financial planning attitude (Philippas & Avdoulas, 2020a).

Financial Literacy and Financial Well-being

The capacity to employ knowledge and skills to efficiently manage monetary resources to ensure financial stability for the duration of one's life can be achieved successfully through FL (President's Advisory Council on Financial Literacy, 2008). In recent decades, FL as a financial resource-managing skill (Hung et al., 2009; Kaur et al., 2022) has emerged as the most extensively researched domain in the globe for improved livelihood and well-being (Agnew et al., 2013; Behrman et al., 2010; Hassan Al-Tamimi & Anood Bin Kalli, 2009).

Gaining the potential to hedge themselves against economic shocks and associated risks, individuals possessing the basic FL are more inclined towards achieving financial goals and eventually contributing to FWB. The relationship between

FL and FWB has been tested in the context of other countries, mostly Malaysia, Australia and Greece, where positive associations have been demonstrated between the two constructs (Philippas & Avdoulas, 2020a; Sabri & Falahati, 2012; Tahir et al., 2021); however, studies have yet to be conducted in lower-middle income countries like India. Researchers have found positive and frequent linkages between the understanding of basic financial concepts and higher levels of FWB (Grohmann, 2018; Joo & Grable, 2004; Lee et al., 2020; Limbu & Sato, 2019; Shen et al., 2016).

H_1: Financial literacy has a positive and significant effect on financial well-being.

Financial Literacy and Retirement Planning Behaviour

The theory of life cycle hypothesis (LCH), proposed by Ando and Modigliani (1963), addresses planning for the short- and long-term future by individuals based on their income, which asserts that people endeavouring to smoothen life-time consumption need to comprehend financial products amidst the diverse range of financial products (Deaton, 2005; Tomar et al., 2021). This calls for understanding financial terms; since studies have highlighted that for efficient financial planning, both short term and long term, and preparing for retirement, a certain level of FL is critical (Ayu Lestari et al., 2020; Lusardi & Mitchell, 2011; Safari et al., 2021), hence, as supported by prior studies, the LCH theory has been considered as the underlying theory to understand the criticality of FL to create efficient RPB in employees (Vivel-Búa et al., 2019).

An extensive foundational premise is that improved knowledge of various financial instruments lessens information-collecting and -processing costs and the psychological and fiscal angst associated with engaging in financial markets and preparing for retirement. Consequently, increased FL hastens the development of retirement plans and the implementation of financial decisions (van Rooij et al., 2012). Preceding studies reconnoitring the link between FL and designing retirement plans (Dvorak & Hanley, 2010) have revealed that people and young adults with moderate income and education have high levels of retirement anxiety (Hayslip et al., 1997) due to a dearth of information about retirement caused by a lack of knowledge of financial notions (Mitchell & Moore, 1998).

H_2: Financial literacy has a significant and positive effect on retirement planning behaviour.

Retirement Planning Behaviour and Financial Well-being

Retirement planning, identified as 'a goal-oriented attitude in which individuals spend the effort to prepare for their retirement life' (Yeung & Zhou, 2017), has the ability to alleviate retirement concerns, control stress and strengthen retirement readiness and morale. To attain this preparedness for eventual security in later years, acquiring insights into FL is intrinsic, as this gives way to FWB. FWB is one of the most formidable matters of contention in societal financial management. Simply put, it can be comprehended as reaping financial security and the economic independence to make prudent financial decisions now and in the future (CFPB, 2015).

Prior studies reveal that low levels of financial literacy lead to deficit planning behaviour, thereby percolating into dissatisfaction in FWB issues, since there exists a high correlation between FL and FWB in retirement as those who strategize for the future and establish long-term aspirations reflect better FWB (Hung et al., 2009; Lusardi & Mitchell, 2008; Xiao & O'Neill, 2018). This has been supported by similar findings in North Carolina (Clark et al., 2021) and Ghana (Adam et al., 2017), which have proposed that by actively planning for retirement, employees can experience greater financial stability and a higher quality of life both during their working years and throughout their retirement (She et al., 2023).

H_3: Retirement planning behaviour of employees has a positive and significant impact on their financial well-being.

The Mediating Role of Retirement Planning Behaviour

Pahlevan Sharif et al. (2020) have highlighted that FL promotes the efficient management of financial resources, which boosts FWB, implying that the capacity to handle monetary resources may intervene in the direct relationship between FL and FWB. Further, it has been discovered that individuals possessing high levels of FL and a proclivity to set long-term financial objectives exhibit a strengthened positive relationship between their financial knowledge and FWB (Lee et al., 2020).

Financial behaviour specifying money management capabilities and strategies (Sabri & Falahati, 2012) pertains to how an individual can handle financial and income situations (Saurabh & Nandan, 2018). Financial behaviour has been illustrated to be a vital aspect of FWB in earlier studies, with individuals who exhibit positive financial behaviour, such as financial planning, avoiding risky financial decisions, regulating their expenses and abstaining from or indulging in compulsive buying, being far more inclined to be financially secure (Chavali et al., 2021; Joo & Grable, 2004; Shim et al., 2009). On the contrary, prior research has consistently identified challenges among young working adults in effectively managing finances and strategically planning expenditures to meet both immediate and long-term financial obligations, as well as fulfilling their needs and desires (Sabri et al., 2022). This hampers their sense of well-being, thus exhibiting the need to address the importance of RPB to enhance their FWB.

Even though abundant literature has demonstrated the direct positive effect of financial behaviour on FWB and its intervention effect on the FL–FWB association (Fan & Henager, 2022; Gutter & Copur, 2011; Sabri et al., 2022; She et al., 2022; Xiao et al., 2014). The mediating effect of retirement planning behaviour (RPB) which reflects the future-oriented dimension of financial behaviour through which individuals utilize their financial knowledge and skills to improve their financial well-being (FWB) has not been studied. Despite extensive evidence on financial behaviour as a mediator, limited research has specifically examined RPB as a distinct mediating mechanism, particularly in emerging economies such as India.

Therefore, drawing from the TPB; Ajzen, 1991) and the future perspective theory (Percy & Elizabeth, 2011) coupled with available existing literature support, it

can be established that increased FL among employees enhances their understanding of the significance of retirement planning and the diverse strategies at their disposal, thereby increasing the likelihood of their active engagement in RPB (Fan et al., 2022; Tomar et al., 2021), such as saving for retirement and making informed investment decisions, which in turn lead to financial security, reduced financial stress and a synergized effect to bring about better overall sense of well-being. In this context, our study attempts to investigate the vital mediating effect of RPB in finding a link between FL and FWB, which serves as a catalyst in leveraging employees' financial knowledge and skills to enhance their overall FWB.

Thus, we formulate the following hypothesis:

H_4: Retirement planning mediates the relationship between financial literacy and financial well-being.

Hypothesized Model

Figure 1 highlights the conceptual framework of the study based on the above literature, where each of the hypotheses, H_1 to H_4, is clearly outlined in the model.

Research Methodology

Research Design

For the purpose of this study, a cross-sectional and quantitative approach was adopted to explore the association among FL, FWB and RPB and the mediating role of RPB in the intertwining relationship between FL and FWB.

The target respondents of the study were working professionals employed in the top five Indian IT sectors based in Kolkata, the state capital of West Bengal, India, for empirical validation. Kolkata has been selected as a sample space for the study because of the following reasons: first, the city's diaspora has spurred it to foster creativity connected with technology, making it an important rising centre for IT outsourcing in eastern India (Tiwari, 2023). Second, being one of the least-paid cities in the IT industry, with a yearly average estimated at $3,600–$4,500, there

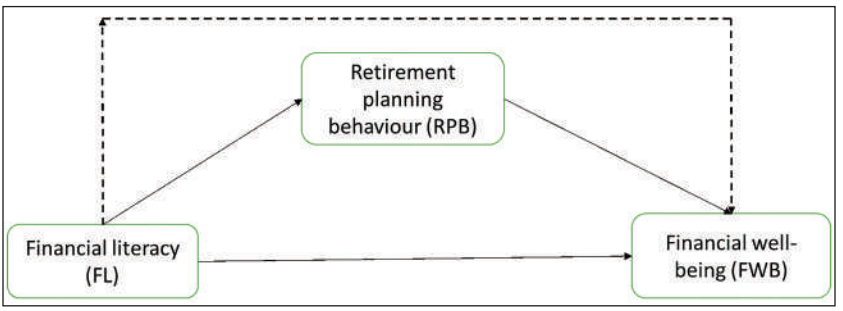


Figure 1. Conceptual Framework.

has been a recent spurt of IT companies in this metro city, employing more than 150,000 employees (Irascu, 2023); thus, a generalization can be drawn.

Survey Instruments

General Information Schedule

Data were collected concerning certain demographic variables such as gender, age, educational qualification, employment category and annual income level of the respondents.

Financial Literacy Scale

FL has been taken up as the exogenous variable for our study, and the five-item scale is adapted from the prior studies by Atkinson and Messy (2012) and OECD (2017, pp. 1–80). One example of a sample item is 'I generally prefer to buy a wide range of stock and shares to diversify my risk of investing in the stock market'. The statements were rated on a 7-point scale, where 1 represented 'strongly disagree' while 7 denoted 'strongly agree.'

Financial Well-being Scale

FWB has been taken as the dependent variable for this study, which has been assessed by using an adapted version of a 9-item scale constructed by Kamaluddin et al. (2018), Mokhtar et al. (2015) and Prawitz et al. (2006). One example of a sample item is 'Your satisfaction level towards your overall financial situation'. The statements were rated on a 7-point scale from 'strongly agree' to 'strongly disagree'.

Retirement Planning Behaviour Scale

The independent variable RPB has been measured by using the 5-item scale adapted from Hassan et al. (2016). One sample item of the scale is 'I am confident about having enough money to live comfortably in retirement years'. The statements were rated on a 7-point scale from 'strongly agree' to 'strongly disagree'.

Sampling and Data Collection

A self-administered questionnaire was constructed and a convenience sampling technique was adopted for collecting data (Sedgwick, 2013; Stratton, 2021). The minimum age criterion for the participants was 18 years. Additionally, participants were informed that their participation in the survey was completely optional and that their answers would be used solely for research purposes.

Initially, we distributed 400 questionnaires and followed up with e-mails and personal calls to encourage responses over a 3-month period. The data collection process extended to almost three and a half months, resulting in 370 responses. After carefully reviewing and excluding irrelevant or incomplete information, we retained 352 data sets for further analysis.

Raykov and Marcoulides (2006) suggest that 'the sample size should be at least ten times greater than the number of free parameters in the proposed model'. In our study, to ensure the adequacy of our sample size, we employed 19

variables, implying that 270 observations would be sufficient; thereby, our sample of 352 data exceeds this requirement, highlighting data adequacy.

Common Method Bias

To mitigate the issue of common method bias, survey questions were meticulously designed to be clear and straightforward, enhancing respondents' understanding (Podsakoff et al., 2003), and respondents were also assured of the confidentiality of their responses (Chang et al., 2010), thereby ensuring their honest responses. For further assessing this bias, Harman's single-factor test was used, where the results explained only 37.711% of the variance, below the recommended threshold of 50%, exhibiting a poor fit for the single-factor solution (Podsakoff et al., 2003). To further validate the absence of common method bias, the variance inflation factor (VIF) was calculated. Notably, the VIFs for all the study variables (ranging from 1.365 to 2.349) were well below the suggested cut-off of 3.3, as outlined by Kock (2015).

Data Analysis Results

Descriptive statistics assessed the respondents' socio-demographic data, and then PLS-SEM was employed to assess the quantitative data. A two-step approach was followed with confirmatory factor analysis (CFA) to assess the measurement model, and then the structural model was examined using a bias-corrected bootstrapping technique, with 5,000 replications to ensure robustness in the analysis for potential biases.

PLS-SEM is an emergent information analysis technique that manages sample size and non-normal facts in business and social science research (Hair, Hult & Ringle, 2014). Further, in a direct comparison with covariance-based SEM (CB-SEM) Hair, Hult & Ringle (2014) found that if the prediction is the goal of the research, PLS-SEM is the preferred alternative. The analysis was conducted in two stages, with the measurement model examined initially, followed by the structural model (Henseler et al., 2015).

Respondents' Profiling

A total of 54.6% males and 45.4% females participated in the survey. A majority of employees (42.6%) were within the age range of 26–33 years, followed by less than 41 years and more than 34 years, with 22.7% representation in the sample. The rest were as follows: 14.8%, 13.1% and 6.8% constituted the age range 18–25 years, 42–50 years and 51 years and above, respectively.

Educational levels showed that 61.1% were post-graduates, 28.1% were graduates, 5.7% were under-graduates and 5.1% had other qualifications. Income levels of the employees were divided into four categories as depicted in Table 1.

Table 1. Demographic Details of Respondents.

Characteristics	Frequency (*n*)	Percentage (%)
Gender		
Male	192	54.6
Female	160	45.4
Age level		
18–25 years	52	14.8
26–33 years	150	42.6
3441 years	80	22.7
42–50 years	46	13.1
51 years & above	24	6.8
Educational level		
Under-graduates	20	5.7
Graduates	99	28.1
Post-graduates	215	61.1
Other qualification	18	5.1
Income level		
Less than 3 lakhs	40	11.4
3–6 lakhs	112	31.8
6–10 lakhs	144	40.9
10 lakhs & above	56	15.9

Measurement Model Assessment

In PLS-SEM analysis, the measurement model analysis is the initial step to ensure reliability and validity of the data.

The results of CFA exhibited an SRMR value of 0.07, which is below the threshold limit of 0.08, suggesting the fitness of the measurement model (Henseler et al., 2015). Further, the item factor loadings were found to be well above 0.50, which seemed adequate for our study (see Table 2; Hair et al., 2020).

All the constructs exhibited Cronbach's α ranging from 0.792 to 0.889, thereby demonstrating the values to be satisfying the criterion of threshold level of 0.70 (Nunnally, 1978). To further confirm the reliability of the measures, the values of CR for all the constructs ranged from 0.857 to 0.91, showing strong internal consistency and construct reliability (Hair et al., 2020). The values of AVE of each construct range from 0.53 to 0.569, indicating that the latent variable effectively accounts for more than half of the variance found in its associated indicators, thus establishing the convergent validity of the construct (Hair, Sarstedt, et al., 2014).

For discriminant validity, two measures have been put forward—the HTMT ratio and the Fornell–Larcker criterion (Henseler et al., 2015).

'HTMT threshold levels suggest the values to be less than or equal to 0.90' (Henseler et al., 2015; Mitra & De, 2024), as highlighted by the results, thus

Table 2. Reliability and Convergent Validity.

Items	Loadings	α	CR	AVE	VIF
Financial Literacy (FL)		0.81	0.868	0.569	
FL1	0.71				1.398
FL2	0.75				1.719
FL3	0.76				1.626
FL4	0.813				1.955
FL5	0.735				1.571
Financial Well-being (FWB)		0.889	0.91	0.53	
FWB1	0.725				1.945
FWB2	0.675				1.646
FWB3	0.78				2.349
FWB4	0.73				2.12
FWB5	0.681				1.771
FWB6	0.761				2.14
FWB7	0.754				1.829
FWB8	0.726				1.722
FWB9	0.713				1.72
Retirement Planning Behaviour (RPB)		0.792	0.857	0.546	
RPB1	0.69				1.365
RPB2	0.726				1.581
RPB3	0.797				1.596
RPB4	0.736				1.636
RPB5	0.741				1.552

establishing the existence of discriminant validity (Jha et al., 2023). The results of the discriminant validity test utilizing Fornell and Larcker's (1981) measure are also shown in Table 3.

Structural Model Analysis

Following the satisfactory assessment of the measurement model, the next phase in evaluating PLS-SEM results was scrutinizing the structural model. The assessment criteria of structural model include the coefficient of determination (R^2), addressing the multi-collinearity issue (VIF) and hypothesis testing through path coefficient significance level (Hair et al., 2013). Additionally, the model's ability to make predictions beyond the data set using the PLS predict procedure has also been evaluated (Shmueli et al., 2019).

To assess multicollinearity, VIF was examined, where the values ranged from 1.365 to 2.349, thus showing all the values below the suggested threshold level (Hair et al., 2019). Therefore, multi-collinearity was not a concern in this study.

Table 3. Discriminant Validity Assessment.

Variables	FL	FWB	RPB
HTMT Correlation Test Result			
FL			
FWB	0.851		
RPB	0.577	0.647	
Fornell–Larcker Criterion			
FL	0.754		
FWB	0.734	0.728	
RPB	0.471	0.555	0.739

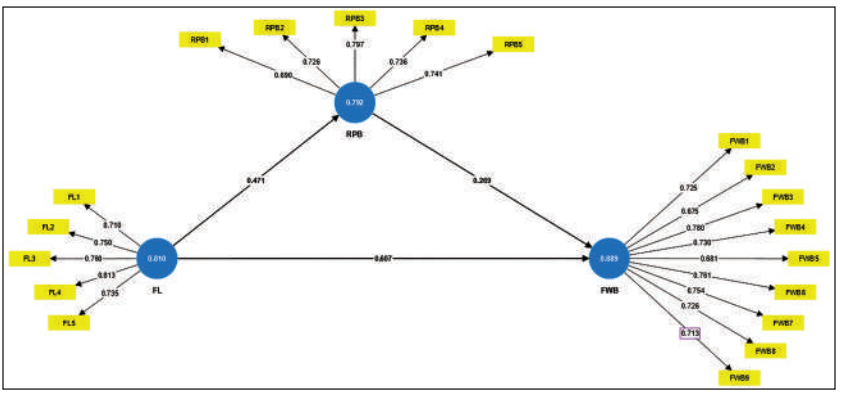


Figure 2. Measurement Model Analysis.

The coefficient of determination, R^2, was estimated, highlighting that the model explains 59.5% of the variance in RPB and 22.2% variance in employees' FWB, thereby indicating moderate in-sample explanatory power of our model (Hair et al., 2011). For the predictive accuracy of the PLS path, the Stone–Geisser's Q^2 is calculated as 0.202 for RPB and 0.577 for FWB, suggesting a moderate and strong predictive relevance for the path model (Hair et al., 2019).

Next, to evaluate the statistical significance of the hypothesized relationship, the bootstrapping procedure was adopted with 5,000 bootstrap samples, no sign changes option and 95% bias-corrected confidence interval.

The results of the path coefficient analysis highlight that all the path coefficients have significant and positive impacts, thereby supporting all the proposed hypotheses (see Table 4 and Figure 2).

Mediation Analysis

Furthermore, H_4 postulates that RPB mediates the relationship between FL and FWB. In this regard, this intervention analysis has been assessed by investigating

Table 4. Path Coefficient Values.

Hypothesis	Relationship	β Value	*SD*	*t* Value	*p* Value	Decision
H_1	FL → FWB	0.607	0.05	12.189	.000	Supported
H_2	FL → RPB	0.471	0.064	7.398	.000	Supported
H_3	RPB → FWB	0.269	0.062	4.356	.000	Supported

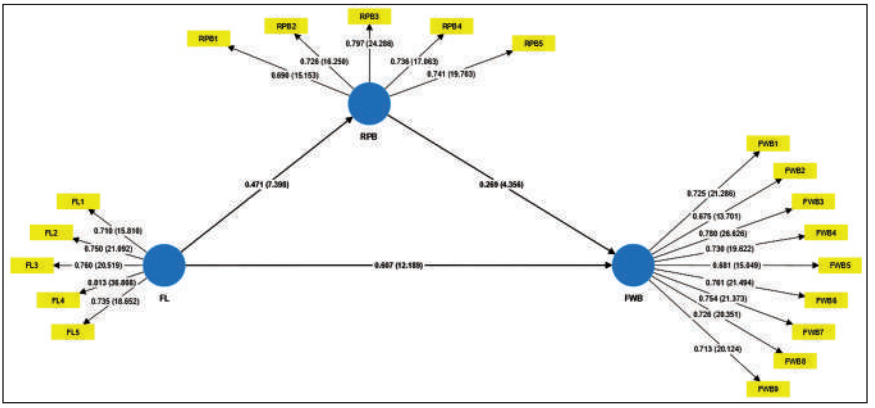


Figure 3. Bootstrapping (*t* Value) for the Model.

Source(s): Authors own work (output using SmartPLS 4.0).

the indirect path between FL and FWB via RPB. Following the recommendations of Preacher and Hayes (2008), the findings show that the confidence intervals of the upper limit (95%) and the lower limit (5%) of the mediated relationship (H_4) do not include zero, indicating the positive significance of the relationship and thereby supporting the hypothesis.

To examine the mediation effect, 'the beta coefficient of independent-mediating and mediating-dependent variables is multiplied'.

The indirect path between FL and FWB through RPB was significant ($\beta = 0.471 \times 0.269 = 0.127$, $t = 3.6$, $p < .001$, $LL = 0.074$, $UL = 0.187$), whereas the total effect ($\beta = 0.734$, $t = 22.336$, $p < .001$) along with direct effect ($\beta = 0.607$, $t = 12.189$, $p < .001$) after introducing the mediator was also significant.

Hence, the result confirms the complementary partial mediating role of RPB in association with FL and FWB. Therefore, H_4 is being accepted. A detailed result of the mediation analysis has been displayed in Table 5 and Figure 3.

Discussion and Implications

Major Findings

Our study is one of the primary empirical studies that has attempted to scrutinize the FL and FWB relationship in the context of Indian IT sector employees using

Table 5. Results of Mediation Analysis.

Total Effects (FL → FWB)			Direct Effects			Indirect Effects							
											Percentile Bootstrap		
Coefficient	*t* Value	*p* Value	Coefficient	*t* Value	*p* Value	Hypothesis	Coefficient	*SE*	*t* Value	*p* Value	Lower	Upper	Decision (Mediation Type)
0.734	22.336	0.000	0.607	12.189	.000	H_4: FL → RPB → FWB	0.127	0.035	3.6	.000	0.074	0.187	Partial

RPB as a mediator. Promoting employees' FWB and making them aware of the benefits of planning ahead for retirement is important because of its far-reaching impact on a country's economy. Additionally, the FWB aspect of employees has been scarcely discussed in the context of Indian working professionals.

The current study verifies the paradigm of FL and FWB to explain employee status in terms of RPB. The findings of the study provide evidence for positive and significant impacts of all the proposed hypotheses of the model. The study makes several significant theoretical contributions by introducing novel concepts, advancing existing frameworks and enhancing our understanding of the subject matter.

The results of this research demonstrate that FL has a substantial impact on FWB of employees (H_1; $\beta = 0.607$, $t = 12.189$, $p < .001$), aligning with the results of prior studies by Grable and Lytton (1998) and Narges and Laily (2011). In the Indian IT sector, where tumultuous cut-throat competition exists, employees face burnout in balancing the management of their financial resources along with the tremendous work pressures that have a cascading impact on their level of FWB. Therefore, understanding the criticalities of financial horizons would act as an anchor for the working population to keep the financial constraints at bay and attain holistic FWB.

As for H_2, the results propound that FL has a positive and significant impact on the RPB of employees ($\beta = 0.471$, $t = 7.398$, $p < .001$). The LCH supports the idea of the criticality of FL for RPB, forming the basis of our findings (Case & Klapper, 2011; Safari et al., 2021). Existing literature studies have revealed that financial knowledge and acquired abilities have a positive relationship with their planning behaviour regarding their pre- and post-retirement phases (Bucher-koenen & Lusardi, 2011; van Rooij et al., 2012). Our study, which has attempted to investigate this effect with regard to Indian IT sector employees, has also found similar findings of the significant relationship of FL with RPB. Employees who are miscalibrated about their FL make suboptimal financial decisions, affecting their long-term planning behaviour. FL empowers employees by equipping them with the knowledge and understanding of retirement planning concepts, facilitating informed decision-making, realistic goal setting, active savings and appropriate investments. Additionally, it enables employees to evaluate risks and implement risk management strategies, leading to enhanced RPB and better preparation for unforeseen circumstances.

Based on TPB (Ajzen, 1991) and the future time perspective theory (Percy & Elizabeth, 2011), the findings of H_3 revealed significant results of the impact of RPB on employees' FWB ($\beta = 0.269$, $t = 4.356$, $p < .001$). Our research findings align with the earlier results of Kadir et al. (2020) and Noone et al. (2009). Involvement by the employees in early planning for post-retirement phases would not only help in alleviating their financial stress but also benefit in smoothening their financial security in later years. Concisely, engaging in retirement planning is crucial for employees' FWB, offering benefits such as security through saving and investing, goal achievement, preparedness for retirement, improved decision-making skills and reduced financial stress, leading to enhanced overall well-being.

Finally, in H_4, RPB was assessed as an intervening construct in the FL–FWB association. The path analysis results demonstrated a complementary partial mediation effect of employees' RPB, which conforms with prior studies showing

an association between FL and RPB (Boisclair et al., 2015; Niu & Zhou, 2018) and RPB and FWB (Kadir et al., 2020; Xiao & O'Neill, 2018), thereby highlighting that FL equips employees with knowledge and skills, enabling them to engage in effective RPB, thus enhancing their FWB, resulting in a positive relationship between FL and overall FWB.

Managerial Implications

The empirical results suggest that organizations need to transition from their conventional role to intervene and support their employees regarding their financial concerns and long-term security. For IT services, this is the most sought-after. Employers must include FWB as a key part of the overall workforce well-being strategy. They may bring on site third-party vendor support as financial counsellors and educators who can identify at-risk employees and provide customized retirement incentives by understanding their financial priorities. Organizations can also set up in-house financial counselling centres to help employees identify the need for FL to plan for their retirement and its cascading consequences on their post-retirement well-being. Overall, recognizing and leveraging the mediating effect of RPB can lead organizations to promote FL, provide retirement benefits and support, prioritize employee FWB and enhance retirement readiness. These efforts contribute to a more engaged and financially secure workforce, ultimately benefiting both employees and the organization as a whole.

Policy Implications

At the national level, financial educators and practitioners who can strategize and administer targeted staff training programmes may be designated. This will correspond with the various stages of their life cycles, skill levels and information needs, reinforcing the necessity of FL. Furthermore, a comprehensive long-term financial security scheme would be designed to consider both objective and subjective markers of FL and their well-being to more effectively assess the programmes' true effects on the targeted audiences. The findings of the partial mediating impact of RPB provide implications for the government, where future planning pro-environment can be created via incentives targeted towards specific income groups or populations with lower levels of FL. This will establish regulations and standards for financial advisors to ensure they provide accurate and unbiased retirement planning advice, provide incentives or create regulations that encourage employers to prioritize employee FWB through retirement planning support and provide safety nets for individuals who may face challenges in retirement planning despite their efforts, such as accessible pension schemes, government-funded retirement benefits and social assistance programmes. These policies would aid in building a holistic and self-subsistence formal financial economy.

Conclusion and Limitations

Owing to the paradigm shift of understanding employees' well-being in monetary terms to its increasing criticality for the survival and development of

organizations around the world (Spreitzer Gretchen & Christine, 2012), employers and organizations have started ensuring that employees possess a sense of security and confidence for their current and future well-being. For this, it is necessary for them to be robust in their financial concepts. This research strives to scrutinize the behavioural effect of FL on FWB via the mediating effect of RPB. Empirically tested hypotheses confirmed the positive and significant associations between the variables, showing the relevance of FWB among employees.

Limitations and Scope for Future Research

Even with the study's significant contributions, it is crucial to acknowledge its limitations. The scope of the study is limited to the Indian IT sector based in Kolkata. Future research can explore other service industries, such as banking, healthcare and educational institutions. Second, the data were obtained through a Web-based survey utilizing non-probability sampling that was not stratified by nation or organization size, increasing the likelihood of impacting data quality. Finally, longitudinal studies can be a better approach in future studies that may determine the time-based interactions of the study variables.

Further, studies related to other scopes of finance affecting an individual, such as financial resilience, financial self-efficacy, financial vulnerability, financial capability and financial socialization agents, can be explored as mediators and moderators for better model conceptualization.

Declaration of Conflicting Interests

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Article

Drivers of Brand Image and Consumer Engagement: The Role of User-generated Content, Brand Storytelling and Collaboration on Online Platforms

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Abstract

Purpose: This research aims to establish an understanding of the drivers of brand engagement and brand image on websites and social media platforms, through independent variables such as brand storytelling, user-generated content (UGC) and collaboration within the S-O-R framework. Given rapidly changing trends and simultaneous consumer preferences, understanding the key drivers behind these shifts is essential.

Methodology: This study uses a standardised online survey tool to gather data from a diverse group of individuals in the state of Gujarat, India. This study analyses the data through partial least squares–structural equation modelling (PLS-SEM) to understand the key drivers of brand image and consumer engagement.

Findings: These findings of the study show positive responses for all the variables, specifically brand storytelling and UGC in context with social media, which indicated shaping consumer engagement and brand image. However, collaboration did not necessarily indicate a positive impact on both consumer engagement and brand image. Also, in the context of websites, UGC did not have a positive impact on consumer engagement.

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Practical implications: This article suggests a strategic selection and use of online marketing channels for brands to foster brand engagement and strengthen brand image.
Originality: The combined significance of brand storytelling, influence of UGC and collaboration on websites as well as social media for understanding the impact on brand image and engagement has not been studied previously.

Keywords
Brand Image, Brand Engagement, User-generated Content, Brand Storytelling, Collaboratio

Introduction

The digital ecosystem has transformed brand communication into a multidirectional and engaging process through which consumers actively co-create content with brands. With the emergence of social networks and community-based content creation on websites, marketers are increasingly required to build content that demonstrates authenticity through storytelling and collaborative strategies (Dwivedi et al., 2023). The online industry has seen countless variations in trends, especially with the expansion of e-commerce and social media platforms, resulting in the emergence of several factors that influence consumers' purchase decisions. With improved technologies and the increased popularity of e-commerce websites and social media platforms, audiences are continuously exposed to diverse online stimuli (Davies et al., 2024), making them more influenced by newer styles, trends and brand narratives on the internet. Consequently, factors influencing buyers' purchase decisions online can be highly influenced by multiple external and internal elements, which further contribute to the formation of brand image and engagement (de Almeida et al., 2025).

Brand image, which has been understood widely in marketing literature as a set of associations, perceptions and emotions held by consumers towards a brand (Keller, 1993), while consumer engagement reflects the degree of cognitive, emotional and behavioural involvement of consumers with the brand-related content (Brodie et al., 2011). As organisations transition from firm-centric to co-creation-based communications, platforms such as a brand's websites, blogs, brand apps and social media platforms facilitate this transition. Therefore, the expansion of the digital ecosystem has significantly accelerated community content creation. Post-COVID studies indicate that consumers increasingly rely on online product reviews given by users of the product on the internet (Tao Chen, 2022), which indicates increasing influence and credibility in user-generated content (UGC). Similarly, Hanadi and Salhab (2023) emphasised that social media is a key driver for a positive brand image and also affects consumers' purchase intention significantly. Further, celebrity endorsement and collaborations with influencers, who communicate compelling narratives that resonate with the brand's audiences (Pattipeilohy & Riry, 2019), strengthen consumer trust and enhance brand recognition and perception towards the brand (Evan, 2021).

Although prior studies acknowledge the increasing importance of multidimensional online strategies in shaping consumer behaviour (Osorio-Andrade et al., 2025), existing literature has largely examined UGC, brand storytelling and collaborations independently. Limited research has attempted to integrate these dimensions within a single framework to understand their simultaneous impact on consumers' psychological and behavioural responses, such as shaping brand image and consumer engagement in digital environments. This indicates a significant theoretical and contextual gap in understanding the combined role of these digital communication strategies within the broader online ecosystem.

Grounded in the stimulus–organism–response (S-O-R) framework (Mehrabian & Russell, 1974), this study conceptualises UGC, brand storytelling and collaborations as stimuli that influence consumers' internal evaluations, leading to responses in the form of enhanced brand image and consumer engagement. By integrating these dimensions into a unified framework, the study seeks to extend the existing literature on digital marketing communication and provide empirical insights into how brands can strategically utilise content marketing strategies for strengthening consumer–brand relationships in the digital ecosystem.

Literature Review

Theoretical Framework: The S-O-R Model

To provide a robust theoretical underpinning for the relationships proposed in this study, the Stimulus-Organism-Response (S-O-R) framework (Mehrabian & Russell, 1974) is integrated. The S-O-R model posits that external stimuli (S) influence internal organismic states (O), which subsequently lead to behavioural responses (R). In the context of digital fashion branding, elements like brand storytelling, UGC and collaborations act as stimuli (S). These elements are perceived and processed by consumers through cognitive and emotional evaluations (O), which then influence outcomes such as brand image and engagement (R). This framework supports previous empirical assertions (Hollebeek et al., 2014) that digital content influences internal psychological states before triggering brand-related behaviours, thereby justifying the chosen relationships within the proposed model.

Brand Storytelling, Social Media and Websites

For a brand to create and foster a healthy customer base has to emotionally connect with the target audience by fabricating a brand image for their audiences. To sustain a stable customer base, marketers should aim to develop deeper, long-lasting and strong brand attachments for consumers (Iveson et al., 2026). For this, marketers take the assistance of brand storytelling. Brand storytelling is to share any story or belief with a target group to arouse bonds in people's minds or emotions so that such a brand becomes more attractive, more recognised and provokes relationships among people in the organisation and with other stakeholders outside the organisation (Kosakarika, 2023). Storytelling has emerged as an effective content marketing strategy that helps brands build meaningful relationships with

consumers by creating emotionally appealing narratives. Such narratives strengthen consumer–brand engagement and encourage stronger brand loyalty by making audiences feel more connected to the brand (Appel et al., 2020). Research also suggests that emotional engagement developed through storytelling reflects the extent to which consumers form deeper psychological connections with brands (Dessart & Pitardi, 2019). In addition, immersive storytelling experiences supported through interactive and vivid content can further enhance audience involvement and engagement. When consumers feel absorbed in a brand narrative, their emotional attachment and sense of presence increase, making storytelling an important mechanism for fostering authentic consumer–brand relationships (Ahmed et al., 2024). A powerful brand story imprints a positive brand idea towards the target audience. The online industry is fuelled by content, and therefore, content marketing appears to be the best for approaching and creating brand image and personality. With a major involvement of influencers, brands can introduce themselves in a very clean and crafted manner. Brand storytelling is useful for building strong brands and brand loyalty because it has the power to persuade consumers, entertain them and imprint a brand in their minds (JungHwa Hong, 2022). Thus, the study hypothesises:

H_1: Brand storytelling has a positive relationship with social media usage.
H_2: Brand storytelling has a positive relationship with website usage.

Collaboration, Social Media and Websites

In the digital marketing age, where people have a very media-driven lifestyle, marketers have evolved their marketing approach towards the marketplace. Now, the content is generated by popular and influential people posting content on the online space, known as influencers. An influencer is an individual with a large following and has a powerful influence on their followers, their opinions and sometimes their decisions. Celebrities, social media stars, industrial experts, brand ambassadors, content creators—bloggers, videographers/vloggers, artists, podcasters and photographers—are the influencers of the modern marketplace. Influencers, due to their large follower base and niche content creation across social media platforms, foster higher audience interaction and engagement as followers often relate to or aspire to the lifestyles and values reflected in their content (Levin et al., 2025). Previous studies have suggested that collaborations with influencers who create relatable and informative content, particularly when aligned with expert perspectives and consistent with their existing values, enhance authenticity and strengthen audience engagement (Paraskeva et al., 2024). The online industry was initially governed by very niche fashion setters, but now it has opened up. The influencers are the driving force of various categories, such as fashion, tech, beauty, lifestyle and travel, and play a very crucial role in trend-setting. Due to consistent content posting about trends and recommendations, they exert an influential force on their followers to engage with their suggestions (Nurfadila, 2020). Social media and the employment of influencers by brands are

a driving force for the purchasing decision of a consumer. Thus, the study hypothesises:

H_3: Collaborations have a positive relationship with social media usage.

H_4: Collaborations have a positive relationship with website usage.

UGC, Social Media and Websites

Brands may now effectively engage with their audience and create a feeling of community by using UGC (Ploscă et al., 2024). It has the potential to significantly impact brand perception, consumer loyalty, brand image and purchasing decisions in the online space. Gharib et al. (2019) contend that better product development and consumer comprehension can be achieved by studying UGC. Businesses can get insights that guide their product design and development process and result in more effective and relevant offers by analysing the feedback, preferences and experiences that consumers share (Fu et al., 2024). Similarly, Djafarova and Bowes (2021) contend that because of its easily navigable design and freely available UGC, social media, especially Instagram, has grown in popularity as a platform for online purchasing. Because they believe UGC, often referred to as electronic word-of-mouth (eWOM), to be truthful and grounded in real-world experiences, consumers are more likely to trust it than traditional marketing communications. UGC is important to drive customer interaction, shape brand perception and influence purchase decisions (Osorio-Andrade et al., 2025). Through its insights into consumer preferences, UGC helps firms generate more relevant products and improve their product development (Gharib et al., 2019). Furthermore, UGC is beneficial in establishing trust and encouraging customer loyalty because of its authenticity and legitimacy (Djafarova & Bowes, 2021). Even though previous studies have recognised the significance of UGC, there is still a significant knowledge vacuum in understanding how UGC, along with brand storytelling and collaboration, can help generate positive brand engagement and develop brand image on websites and social media. Thus, the study hypothesises:

H_7: UGC leads to more social media usage.

H_8: UGC strengthens the website's credibility.

Social Media

Social media has completely changed how companies communicate with their customers. Social media channels present a distinctive chance for brands to interact with clients, increase brand recognition and cultivate customer loyalty. Kim and Ko (2012) state that to sustain an exclusive and appealing image, luxury brands can use social media platforms as a potent tool for storytelling, interaction and communication with their target audience, while Lu et al. (2022) mention that social media has developed into an essential tool for B2C companies to communicate with clients. Crafting compelling communications is still difficult, though. This review of the literature looks at how customer engagement on social media

is affected by the message source and message content (emojis vs. objective information). According to available data, the message's source and content affect consumers' perceptions and levels of trust, which in turn affects engagement. However, knowledge of how these components work together to promote engagement in a business-to-business setting is lacking. Liu et al. (2020) suggest a technique that combines human judgement with big data from social media networks to enhance demand forecasts for new items. They illustrate the difficulties in accurately classifying social media's influence factors on demand forecasting, converting insights into judgements that can be implemented and maintaining data dependability. They also show how effective this method is in a real-world scenario. The literature review investigates how social media influences consumer experiences and propels brand success. It emphasises how crucial social media is to the storytelling and engagement of luxury brands, as well as the efficient communication of B2C businesses. However, the study finds a knowledge vacuum on how message source and content interact to shape customer engagement, especially in business-to-business settings. Subsequent investigations may probe this field more thoroughly and examine the enduring effects of social media involvement on customer conduct and brand allegiance.

Websites

In the past 10 years, websites have transformed, becoming a significant element of digital brand strategy, serving as a dynamic platform that shapes consumer perceptions and nurtures brand engagement (Shehu et al., 2021). In the fashion industry, a brand's website functions as a primary digital touchpoint that has the ability to influence consumer behaviour through visual aesthetics, interactive interface and content framework. A coherent, streamlined website with clear navigations and personalised elements can significantly boost the user experience and nurture consumer retention (Natasha et al., 2021).

As per recent studies, incorporation of brand storytelling, collaborations and UGC into a website design can increase emotional resonance and engagement (Krishen et al., 2021). Similarly, when storytelling is embedded into a brand's digital interface, it creates a profound psychological connection with the users. Likewise, collaborations on websites provide authenticity and cultural relevance, strengthening user trust and involvement (Yin et al., 2026). In the same way, UGC, on a brand's website, builds social proof and improves interactivity, demonstrating brand loyalty and authenticity (Jiang et al., 2025).

Thoughtful website functionalities further support brand image formation and sustained engagement (Xu & Schrier, 2019). Through these dynamics, which demonstrate websites as aid to strategic conduit, brands can operationalise their digital narratives and co-create value with consumers.

Social Media, Websites and Brand Image

Brand image is a consumer's perception of a particular brand, which can be related to the product quality, services or experiences. The online industry is a

rapidly growing industry where marketers have to leave a lasting impression to build a good brand image, and this is where engagement and personalisation play their role in building a brand image. Keller (1993) mentioned that the reflection that the consumer holds about a particular brand depends on how they perceive it and what they think about it. Kotler and Keller (2016) believe a brand image to be the way that customers view a company, shaped by things like experiences, services and quality of products. They underline that brand image is vital in creating consumer satisfaction and loyalty. Besides the significant impact of brand image in building loyalty, it holds a major role in creating engagement, which also positively impacts brand loyalty (Kim & Ko, 2012). Prior studies have also validated that the emotional association with a brand strengthens brand loyalty, which the brands leverage for premium prices (Diniso, 2025). Similarly, in the fashion sector, customer engagement and loyalty are greatly influenced by brand image. Customers' perceptions of a brand are greatly influenced by their experiences, services and product quality. Enhanced consumer satisfaction and loyalty can result from better brand interaction achieved through these components (Orús et al., 2026). Furthermore, brand image enhancement can be achieved through experiences that incorporate components such as UGC (Lanz et al., 2024), brand storytelling (Ahmed et al., 2024) and collaboration (Ika Sari et al., 2024). These tactics in influencing consumer perceptions and emotional ties to the brand have been widely examined in the literature. Through the cultivation of genuine relationships, brands may bolster their trustworthiness and hence cultivate a more positive brand perception. Thus, the study hypothesises:

H_5: Social media usage strengthens the brand image.

H_9: Websites positively impact the brand image.

Social Media, Websites and Brand Engagement

With the rapid changes in online consumption behaviour, brands are under pressure to provide customers with distinctive and customised experiences. To develop strong brand ties and encourage consumer loyalty, engagement is essential (Aldhamiri et al., 2024). Hollebeek and Macky (2019) argue that relationships, trust and brand engagement can only be developed through digital content marketing. It promotes behavioural, emotional and cognitive engagement through the provision of quality content, which in turn increases favourable attitudes, brand equity and brand trust. Pizzi et al. (2022) suggest that engagement is a multidimensional construct of immersion, passion and activation and that interaction, brand attachment, brand trust and brand knowledge all contribute to brand engagement in the metaverse. They contend that these elements eventually influence consumers' inclinations to make in-person purchases and are favourably influenced by the immersive experiences provided by the metaverse. Previous studies have observed that if engagement with the content satisfies the motivation, then the content marketing can strongly influence the advertising value (Mirzaei et al., 2024). By examining the distinct engagement drivers, this research aims to close

the knowledge gap regarding how these two segments of the market drive engagement through different factors. Thus, the study hypothesises:

H_6: Social media usage strengthens brand engagement.

H_{10}: Websites positively impact brand engagement.

Research Methodology

Data Collection and Sample Characteristics

To address our research questions, we gathered data through a survey from individuals in India who are active social media users. We used a convenience sampling approach to reach out to the target population through social media platforms such as WhatsApp, LinkedIn, Instagram and e-mails, asking them to share their perspectives. The survey was done from June to October 2024 to collect the data with the help of a structured self-administered questionnaire (Malhotra, 2004). The questionnaire was divided into two parts: the first being the data about the demographics of the respondents, while the second part addressed the variables of the research model (Figure 1), which were measured through a 5-point Likert scale, where 1 represented strongly disagree and 5 represented strongly agree. The power estimation technique was employed to determine the sample size. G* Power software was used for calculating the required sample size. With an effect size of 0.15, a power value of 0.95 and a maximum of 8 predictors, the required sample size was calculated as 74. A total of 154 responses were collected, of which only 137 were selected for final analysis after eliminating incomplete responses, missing values and outliers, and the given sample size is more than the required sample size. These 137 responses were used for final analysis through partial least squares–structural modelling (PLS-SEM) in SmartPLS. Table 1 presents the descriptive characteristics of the sample.

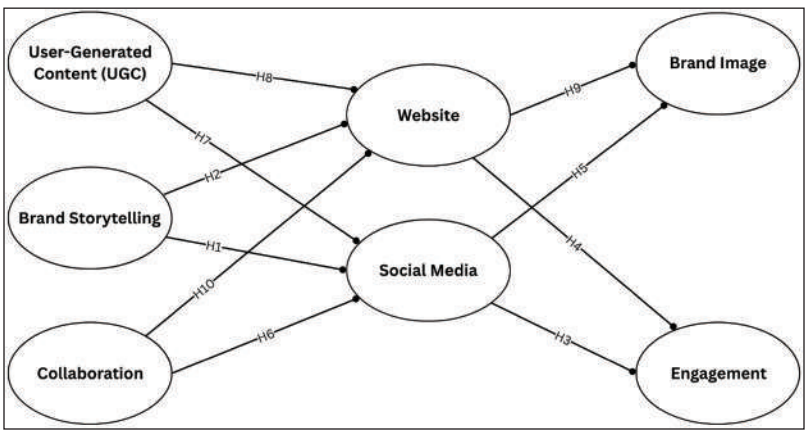


Figure 1. Conceptual Research Model.

Table 1. Sample Description.

		Numbers	Percentage
Gender	Male	77	56.2%
	Female	60	43.8%
Age	Below 20	50	36.49%
	21–30	60	43.79%
	31–40	5	3.64%
	41–50	15	10.94%
	50 and above	7	5.1%
Employment	Entrepreneur	10	7.2%
	Employee	22	16.05%
	Professional	10	7.2%
	Home-maker	3	2.18%
	Student	89	64.96%
	Retired	3	2.18%

Measures

The questionnaire's elements were modified from previously validated scales and adapted for the context of content marketing on online platforms (websites & social media). Brand storytelling has been measured with 5 items adapted from Yu Xie (2021); collaboration with four items adapted from Nataly Levesque and Frank Pons (2020); UGC with three items adapted from Owusu et al. (2016), Nawras et al. (2021) and Dianat et al. (2019); websites with three items adapted from Wang and Tang (2003), Abelse (1998) and Zviran et al. (2006)); social media with two items adapted from Chatterjee and Kar (2020); brand image with three items adapted from Aaker (1996) and Martinez and Chernatony (2004); and engagement with two items adapted from Hollebeek et al. (2014).

Data Analysis and Results

PLS-SEM has been opted for over CB-SEM to handle the complexity of the model involving both reflective constructs, as well as to justify the small sample size of the study (Hair et al., 2020). The analysis of the data has been described in two sections: the first section explains the assessment of the measurement model, and the second section explains the assessment of the structural model.

Measurement Model Assessment

Measurement model assessment measures the reliability, convergent validity and discriminant validity of the model's constructs. Therefore, the first step evaluated the outer loadings of each item in the reflective measurement model, as can be

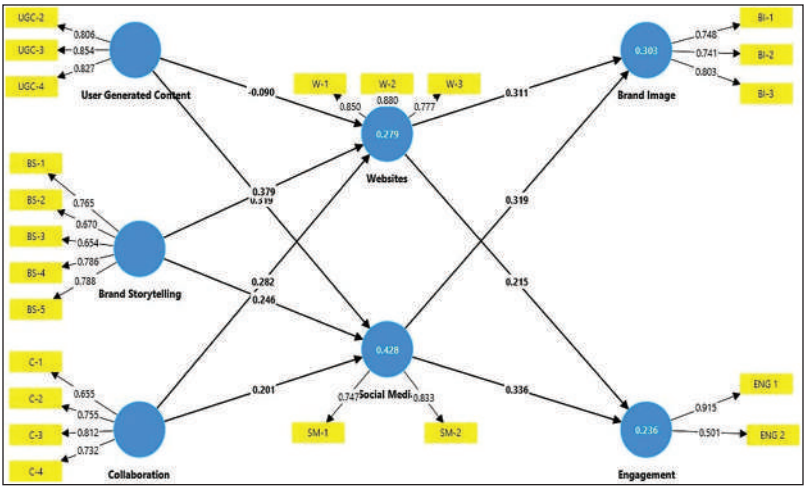


Figure 2. Outer Loading.

seen in Figure 2. After removing UGC1, BS 6, SM 3 and ENG 3 one by one, respectively, whose outer loadings were less than 0.708, all the other items were retained, except BS2, BS3, C1 and ENG 2, but as can be seen in Table 3, all the constructs had AVE more than 0.50; therefore, all the indicators were retained (Hair et al., 2020). Thus, indicator reliability was established.

The next step assessed the internal consistency reliability of each construct through composite reliability values. Table 2 reflects that all the constructs have composite reliability values between 0.70 and 0.90, which is evaluated as 'satisfactory to good' as per (Hair et al., 2019) guidelines, except for engagement; however, since its respective average variance extracted (AVE) value is more than 0.50, internal consistency reliability has been established. The third step measures each construct's convergent validity through AVE, which must be at least 0.50 and above for acceptance (Hair et al., 2019). As can be seen from Table 2, all the AVE values are greater than 0.50, which explain that at least 50% or more of the variation of the items constitutes their respective construct. In the fourth step, HTMT values were calculated to assess the discriminant validity in the outer reflective model. According to Henseler et al. (2015), with a conservative threshold value of 0.85, discriminant validity is established. As can be seen in Table 3, all values lie within the threshold except for cross-loadings of the following constructs: 'engagement and brand image', 'social media and brand image', 'social media and collaboration', 'social media and engagement', 'user-generated content and social media', 'website and engagement' and 'website and social media', which are greater than 0.90; hence 10,000 samples bootstrapping was performed to check if the sample mean lies within the 97.5% confidence interval and zero does not lie in between the confidence interval values of 2.5% and 97.5%. As can be seen from Table 4, the sample mean of all the above-mentioned constructs lies

Table 2. Reliability and Validity Test Results.

	Composite Reliability (rho_c)	Average Variance Extracted
Brand image	0.808	0.585
Brand storytelling	0.854	0.540
Collaboration	0.828	0.548
Engagement	0.688	0.544
Social media	0.770	0.626
User-generated content	0.868	0.687
Websites	0.875	0.700

Note: $p < .001$.

Table 3. Discriminant Validity Test Result (HTMT).

	Brand Image	Brand Story telling	Collaboration	Engagement	Social Media	UGC	Websites
Brand image							
Brand Storytelling	**0.627**						
Collaboration	0.699	**0.701**					
Engagement	1.095	0.851	**0.537**				
Social media	0.916	0.881	0.966	**1.454**			
User-generated Content	0.552	0.783	0.757	0.748	**1.033**		
Websites	0.640	0.556	0.568	0.923	0.909		**0.390**

Note: Values in bold on the diagonal are the AVEs using HTMT.

Table 4. HTMT Bootstrapping Bias-corrected.

	Original Sample (O)	2.5%	97.5%
Engagement <—> Brand image	1.095	0.584	3.819
Social media <—> Brand image	0.916	0.628	1.410
Social media <—> Collaboration	0.966	0.697	1.530
Social media <—> Engagement	1.454	0.777	4.833
User-generated content <—> Social media	1.033	0.778	1.646
Websites <—> Engagement	0.923	0.388	3.164
Websites <—> Social media	0.909	0.597	1.449

between the values of the confidence intervals with no zero in between, as all the values are positive, thus satisfying the requirements for the discriminant validity for the model. Hence, after conducting a confirmatory factor analysis, the results established that the model is fit for conducting structural model assessments.

Structural Equation Model Assessment

Through the establishment of validity and reliability of elements of the measurement model, the model becomes fit for structural model assessment for establishing relationships amongst the variables. Therefore, to proceed further, the issue of multicollinearity was addressed, where VIF values of the inner model have to be

Table 5. Hypothesis Testing.

Hypotheses	Path	VIF	Path Coefficient	2.5%	97.5%	Result	F^2
H_1	Brand storytelling –> Social media	1.784	0.246	0.038	0.411	Supported	0.096 [small]
H_2	Brand storytelling –> Websites	1.784	0.379	0.144	0.563	Supported	0.108 [moderate]
H_3	Collaboration –> Social media	1.644	0.201	−0.031	0.400	Not supported	0.038 [small]
H_4	Collaboration –> Websites	1.644	0.282	0.092	0.453	Supported	0.019 [small]
H_5	Social media –> Brand image	1.385	0.319	0.112	0.502	Supported	0.086 [small]
H_6	Social media –> Engagement	1.385	0.336	0.174	0.464	Not supported	0.044 [small]
H_7	User-generated content –> Social media	1.840	0.319	0.087	0.546	Supported	0.048 [small]
H_8	User-generated content –> Websites	1.840	−0.090	−0.330	0.153	Not supported	0.051 [small]
H_9	Websites –> Brand image	1.385	0.311	0.109	0.494	Supported	0.106 [moderate]
H_{10}	Websites –> Engagement	1.385	0.215	−0.013	0.405	Not supported	0.068 [small]

Table 6. R^2 Values.

	R^2	SRMR
Brand image	0.303	0.07
Engagement	0.236	
Social media	0.428	
Websites	0.279	

less than 3.33, and Table 5 reflects that all the values are less than 3, thus establishing that there is no issue of multicollinearity (Henseler et al., 2014). Next, to assess the inter-construct relationships, bootstrapping with 10,000 resamples was performed (Hair et al., 2019). Table 5 explains the significance of the path coefficient and effect size (F2), while Table 6 explains the coefficient of determination (R2). The results indicate acceptance of all hypotheses as they were found to be positively significant, except for H_3, H_8 and H_{10}, as the value 0 appears between the confidence intervals. Additionally, Table 6 explains the coefficient of correlation of all the dependent variables, that is, R2 reflects on the predictive power of the four endogenous variables, that is, brand image, engagement, social media and websites, where brand image explains 30% of the variance, engagement only 23.6%, dominant 42.8% by social media and 27.39% by websites is explained. As per Cohen (1988), these values are substantial. Also, since the SRMR value is less than 0.08, the fitness of the model has been established.

Discussion and Conclusion

The results show that social media platforms, particularly Instagram, play a significant role in influencing consumer behaviour and brand perception and consumers strongly believe that fashion brands can increase engagement by prioritising social media marketing, making it the most effective strategy, followed by meaningful brand interactions and building a strong brand image. According to the results, influencer marketing and UGC, such as reviews and social media posts, are important; they are given somewhat less weight than celebrity endorsements, social responsibility programmes and personal interactions.

Nonetheless, social media engagement with brands through the introduction of new products and tailored experiences turned out to be important factors in determining customer satisfaction. It has been determined that elements such as product quality, cost and design have a major impact on how consumers perceive a brand, making them crucial for building loyalty, as per the findings.

The results highlight how UGC, brand storytelling and collaboration shape consumer engagement and brand image on online platforms. Brand storytelling has a moderate impact on website interactions (H_2) and a somewhat significant impact on social media (H_1), which supports its function in fostering brand image and consumer engagement. These findings are consistent with those of Dolan et al. (2019), who highlighted how well-structured and captivating storylines impact audience engagement.

When it comes to influencing customer engagement and brand image, collaboration produces mixed results. H_3 is not supported, implying that collaboration has little effect on social media engagement; however, H_4 is supported, demonstrating that collaboration has a good effect on websites as it improves credibility and trust for the brand and sustains a brand storytelling narrative. These results imply that although collaboration works well in controlled settings like websites, it cannot be the main factor influencing participation on dynamic social media platforms (Smith & Taylor, 2019).

Additionally, the impact of social media on brand image (H_5) and consumer engagement (H_6) is demonstrated. H_5 is supported, suggesting that social media, with the help of UGC (supported in results) and brand storytelling, results in higher levels of customer engagement and boosts brand image, which indicates that consumers may prefer consuming such content on social media that they can trust, instead of collaborations where a sign of consumers are pushed to consume content trying to sell a brand/product. This implies that although social media improves brand image, further components like content generated by consumers themselves and emotional associations with a brand through storytelling might be needed for engagement (Kaplan & Haenlein, 2021).

On the other hand, one of the most important factors shaping consumer perception and brand image is UGC (H_7) because it provides unbiased views to consumers, demonstrating that UGC has a beneficial impact on social media engagement and strengthens the interactive associations that consumers frame with the brand. However, H_8, which proposed that UGC also impacts websites to build brand image and consumer engagement, has been rejected. This implies that UGC has a limited role in static online platforms like websites, in contrast to interactive platforms like social media (Kumar et al., 2020). This can be justified by knowing the essence of UGC, where it requires consumer–brand interactions, which can be noticed more on social media platforms.

Similarly, there are conflicting results from websites and their impact on consumer engagement and brand image. Results for H_9 show that websites have a major impact on brand image, highlighting the significance of well-designed digital platforms for the growth of brands (Chaffey & Smith, 2021), which implies that the presence of a well-made brand website can build trust, which transforms into a soothing brand image. However, H_{10} is not supported, indicating that websites need to incorporate some interactive elements in their websites to increase customer engagement.

The results of the study align with Ajzen (1991), which emphasises how social media usage affects customer attitudes and actions. This study confirms that developing strong relationships with customers and building a positive brand image on digital channels requires meaningful storytelling, regular content distribution and interactive participation. High-quality goods and gripping stories can be combined by brands to produce unforgettable customer experiences that leave a lasting impact for strengthening brand image and encouraging engagement.

In conclusion, this study highlights the crucial role of social media, particularly Instagram, in shaping brand image and consumers' perception of the brand. Displaying a consistent, engaging and personalised brand storytelling narrative on

social media and the website significantly impacts consumer engagement by building a brand image through relatable content.

Today, brands must create a lasting impression, and offering memorable experiences and striking a balance between maintaining a positive brand image and keeping up with continuous consumer engagement and interactions can ensure growth in the respective markets.

Managerial Implications

The findings of this study offer valuable insights for managers and decision-makers in the online industry, particularly leveraging social media marketing to enhance consumer engagement and brand storytelling (Godey et al., 2016). Managers should prioritise social media platforms as key strategic tools for shaping consumer behaviour and brand image (Kaplan & Haenlein, 2010). Focusing on improving UGC through customer satisfaction and frequent personalised social media content updates, and collaboration can boost engagement, create deep brand connections and improve the brand image (Schivinski & Dabrowski, 2016). To keep customers confident and loyal, content must be of the highest calibre, coherently organised and constant (Ashley & Tuten, 2014).

Managers should concentrate on delivering consistent brand stories on all social media platforms to guarantee a seamless consumer experience and strengthen brand image. Managers should especially invest in social media that promotes two-way communication, which can help them deepen customer engagement. Although influencer marketing and UGC may not hold the highest priority, they remain influential in building trust and authenticity (Djafarova & Rushworth, 2017). In addition to encouraging customers to provide evaluations and material that represent their brand experiences, managers should work with relevant influencers (Evans et al., 2017). Managers should combine social media initiatives with e-mail marketing, in-store promotions and loyalty programmes as part of a larger multi-channel strategy to optimise their impact. E-mail discounts that are tailored to a recipient's social media activity, for example, can increase engagement and conversions (Ashley & Tuten, 2014). By implementing these strategies, brands can strengthen their market position and foster customer loyalty, engagement and sustainable growth in today's dynamic and competitive digital landscape (Kaplan & Haenlein, 2010).

Theoretical Implications

This study provides crucial theoretical insights into the relation of social media, personalisation, engagement and consumer behaviour. It highlights the transformative role of social media platforms, especially Instagram, in shaping consumer perception of the brand image and driving their buying behaviour (Godey et al., 2016). By examining key dimensions of UGC, such as content quality, consistent content and interactivity, the research expands existing frameworks surrounding

consumer experiences (Schivinski & Dabrowski, 2016). The study highlights the importance of relevant, consistent content and fostering two-way communication to improve brand engagement and brand image, effectively blending the concepts of brand storytelling, digital communication (through social media) and consumer engagement (Ashley & Tuten, 2014). Additionally, it also broadens knowledge of multi-channel marketing tactics by showing how social media initiatives can support more conventional platforms like websites to grow on online platforms (Kaplan & Haenlein, 2010).

The differential impact observed across platforms (i.e., social media versus websites) highlights the organismic filtering process within the S-O-R model. The ineffectiveness of UGC on websites, as opposed to social media, underscores that stimulus effectiveness is context-sensitive and moderated by platform-specific features that shape consumer engagement and brand image as a response. Therefore, the study extends the S-O-R framework by emphasising the relevance of authentic content in the form of brand storytelling and user-generated content, acting as a stimulus, generating differing responses of brand image and consumer engagement through different organism contexts, that is, websites and social media. This model focuses on content strategy, which represents platform-specific principles, adaptable to changing technological advances such as AI and others that will follow.

Limitations and Future Research

The study mainly focuses on the impact of certain factors on social media and websites to build brand image and consumer engagement. This research may have overlooked studies on different industries or may have different contexts related to these factors. The data collection is majorly confined to the area of Gujarat, and the audience is available through social media channels like Instagram, Facebook and LinkedIn, resulting in region-specific and platform-specific outcomes; therefore, it is not applicable universally. Also, convenience sampling was used, which may not represent the target audience completely. This article can serve as a foundation for research in the same domain but in different geographical regions.

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Article

Evaluating the Social Dimension of ZED Certification: A Qualitative Study of MSMEs in Haryana

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Abstract

The growing emphasis on sustainable industrial development has increased attention to integrating economic, environmental and social sustainability within manufacturing systems. In India, the Zero Defect Zero Effect (ZED) Certification Scheme was introduced to improve the quality standards and environmental performance of micro, small and medium enterprises (MSMEs). However, limited research has examined how the framework operationalises social sustainability within workplace settings. This study examines the social sustainability dimension of the ZED framework through qualitative field-based evidence collected from 92 manufacturing MSMEs in Haryana, including 46 ZED-certified and 46 non-certified firms. A matched comparative design was adopted to improve comparability across firms based on size, industrial classification and product similarity. Data were collected through field observations, open-ended interviews and handwritten field notes and analysed using a manual inductive thematic analysis. The findings indicate that while ZED certification contributes to stronger documentation systems, procedural awareness and visible safety compliance, deeper workplace practices relating to labour welfare, safety enforcement, working conditions and contract labour accountability remain unevenly institutionalised. The study further benchmarks the ZED framework against international social sustainability frameworks and reporting systems, including ISO 26000, SA 8000, B Corp Certification, the ILO Better Work Programme and the Business Responsibility and Sustainability Reporting framework. The comparison suggests that ZED lacks measurable social sustainability indicators and structured

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accountability mechanisms necessary for consistent workplace implementation. The findings indicate that the framework appears more effective in improving procedural compliance than in shaping deeper workplace practices. The study concludes by proposing policy reforms aimed at strengthening the social sustainability dimension of the ZED framework within MSME contexts.

Keywords

ZED Scheme, triple bottom line, MSMEs, social sustainability, qualitative analysis, worker welfare

Introduction

Sustainability in manufacturing has increasingly evolved beyond narrow concerns of productivity and environmental compliance to include broader questions of labour welfare, workplace equity and long-term social responsibility (Blandino & Montagna, 2025). Contemporary sustainability discourse emphasises that industrial systems cannot be considered sustainable if economic and environmental gains are achieved at the cost of worker well-being and social protection (Zafar et al., 2023). This broader understanding is reflected in the triple bottom line (TBL) framework, which conceptualises sustainability through the interconnected dimensions of profit, planet and people (Elkington, 1998). While the economic and environmental dimensions of sustainability often receive greater institutional and policy attention, the social dimension remains comparatively underdeveloped, particularly within manufacturing systems operating under resource constraints (Mies & Gold, 2021). Social sustainability includes issues such as occupational safety, fair wages, worker welfare, training, inclusivity, reasonable working hours and equitable labour practices, all of which contribute to organisational resilience and long-term industrial sustainability (Gamberini & Pluchino, 2024).

The importance of social sustainability becomes particularly significant within micro, small and medium enterprises (MSMEs), which represent a major source of industrial employment in developing economies such as India (Mani et al., 2020). Despite their economic importance, many MSMEs operate through informal labour arrangements, weakly formalised workplace systems and limited administrative capacity (Pham & Srivastava, 2024). Existing research by Sharma et al. (2026b) and Johanes et al. (2022) has shown that workplace practices in MSMEs are often characterised by inconsistent safety implementation, informal labour management and uneven welfare systems. Such conditions may affect both worker well-being and broader organisational stability.

In response to these challenges, sustainability certifications and governance frameworks have increasingly emerged as institutional mechanisms intended to shape organisational behaviour and encourage firms to adopt more structured operational practices (Wörner et al., 2025). International frameworks such as ISO 26000, SA 8000, B Corp Certification, the ILO Better Work Programme and Fair Trade or Ethical Trading Initiative (ETI) standards attempt to institutionalise

social sustainability through measurable indicators, periodic audits, reporting systems and structured compliance mechanisms (El-Said et al., 2022). These frameworks operationalise social sustainability through structured indicators and accountability mechanisms relating to workplace practices and labour conditions (Torres et al., 2023).

Within the Indian context, the Government of India introduced the Zero Defect Zero Effect (ZED) Certification Scheme to improve the quality standards and environmental performance of MSMEs while enhancing their global competitiveness. ZED certification is organised across Bronze, Silver and Gold levels and evaluates firms across multiple operational parameters related to manufacturing quality, environmental management, process efficiency and workplace systems. The scheme has contributed to increasing awareness regarding quality management and environmental responsibility among MSMEs and has encouraged greater documentation and procedural standardisation in several operational areas.

The distribution of operational parameters across certification levels is illustrated in Table 1.

As illustrated in Table 1, the majority of ZED parameters focus on operational efficiency, quality management and environmental processes, while comparatively fewer parameters directly address social sustainability and labour-related workplace systems. The specific social sustainability parameters embedded within the framework are summarised in Table 2.

However, despite its broader sustainability orientation, the social sustainability dimension within the ZED framework remains comparatively weakly operationalised. Although the framework includes parameters relating to occupational safety, human resource management and workplace organisation, these provisions remain broadly defined and supported by limited measurable indicators or implementation guidance. In highly informal MSME environments, such ambiguity may result in uneven implementation of workplace practices across firms (Nautiyal et al., 2025).

Despite the growing policy significance of the ZED Scheme, limited research has examined how its social sustainability provisions function within workplace settings. Existing studies have focused primarily on quality improvement, environmental performance and manufacturing competitiveness, while comparatively little attention has been devoted to labour practices and workplace welfare systems within certified MSMEs. In addition, limited comparative evidence exists regarding differences between ZED-certified and non-certified firms in relation to social sustainability practices.

Against this background, the present study critically examines the social sustainability dimension of the ZED Certification Scheme through field-based evidence collected from manufacturing MSMEs in Haryana. Drawing upon qualitative field inquiry across 92 MSMEs, including 46 ZED-certified and 46 non-certified firms, the study investigates how social sustainability practices are operationalised within workplace environments and evaluates the extent to which ZED contributes to the institutionalisation of meaningful social practices. The study further benchmarks the social sustainability orientation of ZED against

Table 1. Distribution of ZED Certification Parameters Across Bronze, Silver and Gold Levels.

S. No.	Parameters	Bronze	Silver	Gold
1	Leadership	✓	✓	✓
2	Swachh Workplace	✓	✓	✓
3	Occupational (Workplace) Safety	✓	✓	✓
4	Measurement of Timely Delivery	✓	✓	✓
5	Quality Management	✓	✓	✓
6	Human Resource Management		✓	✓
7	Daily Works Management		✓	✓
8	Planned Maintenance & Calibration		✓	✓
9	Process Control		✓	✓
10	Product Quality & Safety (Testing / Certification)		✓	✓
11	Material Management		✓	✓
12	Energy Management		✓	✓
13	Environment Management		✓	✓
14	Measurement and Analysis		✓	✓
15	Supply Chain Management			✓
16	Risk Management			✓
17	Waste Management (Muda, Mura, Muri)			✓
18	Technology Selection & Upgradation			✓
19	Natural Resource Conservation			✓
20	Corporate Social Responsibility			✓

Source: MSME sustainable (ZED) certification framework and guidelines, Government of India.

Notes: The table illustrates the distribution of operational parameters across the three certification levels within the ZED framework. Parameters directly associated with social sustainability remain limited in comparison to quality, process and environmental management dimensions.

major international frameworks and sustainability reporting systems in order to identify structural gaps and potential areas for policy reforms.

The study is guided by the following objectives:

1. To examine how the social sustainability dimension of the ZED Scheme is operationalised within MSMEs
2. To compare social sustainability practices between ZED-certified and non-certified MSMEs
3. To evaluate the extent to which the ZED framework institutionalises social sustainability practices in comparison to established international frameworks
4. To propose policy reforms for strengthening the social sustainability dimension of the ZED framework

Table 2. Operationalisation of Social Sustainability Within the ZED Framework.

Parameter No.	ZED Parameter	Social Sustainability Dimension	Certification Level	Operational Depth Within ZED	Institutional Limitation
3	Occupational safety	Workplace safety and worker protection	Bronze, Silver, Gold	Basic safety visibility and compliance expectations	Limited emphasis on behavioural enforcement and safety culture
6	Human resource management	Workforce administration and employee management	Silver, Gold	Encourages HR documentation and record maintenance	Lacks measurable welfare and employee protection indicators
7	Daily work management	Workplace coordination and labour organisation	Silver, Gold	Focuses on operational workflow management	Limited guidance on labour conditions and worker participation
20	CSR and community engagement	Social responsibility and external stakeholder engagement	Gold	Broad expectation of social contribution	No structured framework for worker-centred social accountability

Source: Authors' compilation based on the MSME sustainable (ZED) certification framework and guidelines.

Note: The table summarises the principal ZED parameters associated with social sustainability and highlights the operational limitations affecting their institutional implementation within MSMEs.

To situate these concerns within existing scholarship, the following section reviews the literature on social sustainability, MSME workplace systems and the role of certification frameworks in shaping organisational practices.

Literature Review

Triple Bottom Line and Social Sustainability

The understanding of sustainability within industrial systems has expanded beyond economic growth to include environmental protection and social responsibility (De Almeida Barbosa Franco et al., 2024). This broader perspective is reflected in the TBL framework proposed by Elkington (1998), which conceptualises sustainability through the interconnected dimensions of profit, planet and people. While economic and environmental sustainability often receive greater institutional attention due to their measurable nature, the social dimension remains comparatively difficult to operationalise within organisational systems (Bentley, 2025).

Social sustainability within manufacturing environments includes issues relating to occupational safety, labour welfare, training, equitable treatment, working conditions and worker well-being (Firescu & Filip, 2025). Existing research suggests that industrial sustainability initiatives frequently prioritise environmental compliance and production efficiency while treating labour welfare primarily as a compliance obligation rather than an integrated organisational objective (Montesano et al., 2023). Scholars have therefore argued that meaningful social sustainability requires structured organisational systems capable of embedding labour protections and welfare practices into everyday workplace routines (Amrutha & Geetha, 2019).

The importance of social sustainability becomes particularly significant within labour-intensive manufacturing systems where worker welfare directly affects productivity, organisational stability and long-term operational resilience (Kumari & Singh, 2024). Studies have shown that safe working environments, structured training systems and stable labour practices contribute not only to worker well-being but also to improved operational efficiency and reduced workforce instability (Firmansyah et al., 2024).

MSMEs, Informality and Workplace Systems

The challenges associated with implementing social sustainability are especially pronounced within MSMEs, which operate under conditions of financial constraints, informal managerial systems and limited administrative capacity (Gonçalves et al., 2024). In developing economies such as India, MSMEs represent a major source of industrial employment but often rely on flexible labour arrangements and weakly formalised workplace systems (Hammer et al., 2022).

Research on MSMEs has consistently highlighted the prevalence of informal labour relations, discretionary management practices and inconsistent implementation of worker welfare systems (Au et al., 2023; De Carvalho et al., 2021). Many enterprises lack structured human resource systems, formal grievance

mechanisms or standardised workplace policies relating to safety, working hours and employee welfare (Graham et al., 2020). Instead, workplace decisions frequently depend on owner discretion and operational pressures associated with fluctuating production demands.

The widespread use of contract labour further complicates accountability structures within MSMEs. Outsourced labour arrangements may reduce operational costs and increase flexibility for firms but often create fragmented responsibility for worker welfare and workplace protection (Singh et al., 2019). Such conditions can weaken the implementation of consistent social sustainability practices across workplaces.

Given these structural limitations, scholars have argued that external governance mechanisms such as sustainability certifications and reporting systems may play an important role in encouraging organisational formalisation and improved workplace governance within MSMEs (Nautiyal et al., 2025).

Sustainability Certifications and Social Sustainability Governance

Sustainability certifications increasingly function as governance mechanisms designed to shape organisational behaviour through standards, monitoring systems and compliance procedures (Martinez, 2025). In the context of social sustainability, certification frameworks attempt to translate broad ethical principles into operational workplace practices through measurable indicators and accountability mechanisms.

Research suggests that the effectiveness of certification systems depends significantly on the extent to which sustainability expectations are clearly operationalised within organisational processes (Rector et al., 2022). Frameworks incorporating measurable indicators, audits, reporting systems and worker accountability mechanisms are generally more effective in encouraging sustained organisational implementation of labour-related practices (Torres et al., 2023). In contrast, systems relying primarily on broad normative expectations may encourage symbolic compliance in which visible documentation improves without substantial transformation of workplace practices (Durand et al., 2017).

International frameworks such as SA 8000, ISO 26000, B Corp Certification and the ILO Better Work Programme operationalise social sustainability through structured standards relating to occupational safety, labour rights, welfare systems, training and worker participation (Chiarini & Vagnoni, 2017). Similarly, the Business Responsibility and Sustainability Reporting (BRSR) framework in India requires structured disclosure relating to employee welfare, workplace safety, contract labour and grievance mechanisms. These systems demonstrate the importance of measurable indicators and accountability structures in institutionalising workplace sustainability practices.

ZED and the Social Sustainability Gap

The ZED Certification Scheme was introduced by the Government of India to improve manufacturing quality, operational efficiency and environmental

responsibility among MSMEs. The framework seeks to strengthen the competitiveness of Indian MSMEs through structured certification processes linked to manufacturing and sustainability performance.

Although the framework includes certain parameters relating to occupational safety, human resource management and workplace organisation, its social sustainability dimension remains comparatively broad and weakly operationalised. Unlike international social sustainability frameworks that rely on measurable labour indicators and structured accountability mechanisms, the social provisions within ZED provide limited guidance regarding implementation and performance evaluation.

Despite the increasing policy importance of the ZED framework, limited research has examined how its social sustainability dimension functions within actual workplace settings. Existing discussions have largely focused on manufacturing quality, environmental performance and competitiveness, while comparatively little attention has been devoted to labour-related practices and workplace governance systems within certified MSMEs.

Accordingly, the present study examines how social sustainability practices are operationalised within ZED-certified and non-certified MSMEs and evaluates the extent to which the framework contributes to the institutionalisation of workplace sustainability practices. The study further benchmarks ZED against major international social sustainability frameworks in order to identify structural limitations and potential areas for policy reforms.

Building on these conceptual concerns, the study adopts a comparative field-based research design to examine how social sustainability practices are operationalised within ZED-certified and non-certified MSMEs.

Methodology

Research Design

This study adopts a qualitative comparative research design to examine how the social sustainability dimension of the ZED Certification Scheme is operationalised within manufacturing MSMEs in Haryana. A qualitative approach was considered appropriate because the study seeks to understand workplace practices, organisational behaviour and labour-related experiences that cannot be adequately captured through quantitative indicators alone (Awasthy, 2015; Lall, 2023). Social sustainability within MSMEs often operates through informal managerial arrangements, undocumented practices and workplace routines that require direct field-level engagement to be examined meaningfully. Consequently, field-based qualitative inquiry provides greater insight into how social sustainability practices are interpreted, implemented and experienced within everyday workplace settings.

The study further adopts a matched comparative framework to enable systematic comparison between ZED-certified and non-certified MSMEs operating under relatively similar structural conditions. Comparative designs are particularly important in MSME research because firms often differ substantially in terms of size, industrial processes, managerial structures and operational

complexity, all of which may influence workplace practices independently of certification status (Dewi et al., 2025; Sun & Cheng, 2002). Without appropriate matching, observed differences between certified and non-certified firms may reflect broader structural variation rather than the potential influence of certification systems. The matched comparative design, therefore, improves internal comparability by reducing observable differences between firms and allowing the analysis to focus more directly on variation in workplace practices and organisational routines associated with certification status.

The study is interpretive rather than causal in orientation. The objective is not to establish direct causal effects of certification but to critically examine how social sustainability practices are organised within workplace settings and whether certification appears associated with greater institutionalisation of such practices. Accordingly, the findings are interpreted as comparative and exploratory rather than causal.

Sampling Strategy and Matched Comparative Framework

The study draws upon field evidence collected from 92 manufacturing MSMEs located across five districts of Haryana: Faridabad, Gurugram, Panipat, Karnal and Sonipat. Haryana was selected as the study region because it contains a relatively high concentration of ZED-certified manufacturing MSMEs, particularly at higher certification levels, making it an appropriate empirical setting for examining certification-related workplace practices. The selected districts also represent important industrial clusters characterised by diverse manufacturing activities, including textiles, engineering products, food processing, machinery manufacturing, fabricated metal products and apparel production.

The final sample consisted of 46 ZED-certified MSMEs and 46 non-certified MSMEs. The study employed a structured one-to-one matching strategy designed to improve comparability between certified and non-certified firms. Matching was conducted sequentially using three criteria: (a) firm size category (micro, small and medium); (b) two-digit National Industrial Classification (NIC) sector classification; and (c) product-level similarity. The profile of the matched ZED-certified firms included in the study is presented in Table 3. This matching strategy was adopted to minimise structural variation across firms and ensure that comparisons were conducted between enterprises operating within relatively similar production environments.

The ZED-certified sample was restricted to firms holding Silver or Gold certification levels. Bronze-certified firms were excluded because Bronze certification relies primarily on self-assessment procedures without mandatory external verification. Since the study aims to evaluate whether certification contributes to the institutionalisation of workplace practices, the inclusion of externally verified Silver and Gold firms was considered methodologically more appropriate. In addition, only firms that had held certification for more than 1 year were included in the study. This criterion was introduced to reduce the likelihood of capturing temporary audit-driven adjustments immediately following certification and instead examine more established organisational practices.

Table 3. Profile of Matched ZED-certified MSMEs Included in the Study (n = 46).

Category	Classification	Number of Firms	Percentage
Firm size	Micro	12	26.09
	Small	28	60.87
	Medium	6	13.04
Certification level	Silver	21	45.65
	Gold	25	54.35
Sector (NIC-2)	Food products (10)	6	13.04
	Textiles (13)	10	21.74
	Wearing apparel (14)	9	19.57
	Leather (15)	2	4.35
	Chemicals (20)	1	2.17
	Rubber & plastics (22)	1	2.17
	Fabricated metals (25)	5	10.87
	Electronics (26)	1	2.17
	Electrical equipment (27)	3	6.52
	Machinery (28)	4	8.70
	Motor vehicles (29)	3	6.52
	Furniture (31)	1	2.17
District	Faridabad	17	36.96
	Gurugram	10	21.74
	Panipat	8	17.39
	Karnal	6	13.04
	Sonipat	5	10.87

Source: Authors' fieldwork data collected from manufacturing MSMEs in Haryana (January–May 2025).

Note: The sample includes only Silver- and Gold-certified MSMEs that had maintained certification status for more than 1 year. Bronze-certified firms were excluded because Bronze certification relies primarily on self-assessment without mandatory external verification.

The identification of certified firms was based on official government records relating to ZED-certified enterprises. Non-certified firms were subsequently selected through the matching framework to ensure comparability across sectoral and operational characteristics. During the fieldwork process, two initially identified ZED firms could not be visited due to non-participation, and their corresponding matched non-certified firms were also excluded in order to maintain balance within the comparative design.

Although the matched framework improves internal comparability, it does not eliminate the possibility of selection bias arising from unobserved organisational characteristics such as managerial orientation, internal leadership quality or prior commitment to formalisation practices. Consequently, the findings should be

interpreted cautiously as comparative associations rather than definitive evidence of certification effects.

Data Collection Procedures

Data collection was conducted between January and May 2025 through field visits to participating MSMEs. A field-based approach was considered particularly important because social sustainability practices within MSMEs are frequently informal, partially undocumented and embedded within day-to-day workplace interactions. Direct observation and workplace engagement, therefore, provided important contextual insights that would have been difficult to capture through structured surveys alone.

Data were collected primarily through open-ended unstructured interviews and workplace observations. The use of open-ended interactions allowed respondents to discuss operational realities, workplace challenges, labour practices and organisational routines in greater depth than would have been possible through highly structured interview formats. This approach was especially useful given the diversity of MSME organisational structures and the highly informal nature of many workplace practices.

Interviews were conducted with multiple categories of respondents, including firm owners, plant heads, supervisors, managers and workers. In several micro enterprises where managerial and operational roles overlapped, interviews were conducted with individuals directly responsible for day-to-day operational activities. Each field interaction lasted approximately 1 hour on average, allowing sufficient time for workplace observation and discussion regarding labour practices, safety systems, working conditions, welfare arrangements and organisational procedures.

The interviews focused on themes relating to occupational safety, working hours, human resource practices, leave systems, wages, welfare benefits, training arrangements, contract labour management and workplace organisation. In addition to interviews, workplace observations were conducted to examine visible operational practices such as the use of protective equipment, safety signage, workplace organisation, employee interactions and evidence of formalised management systems. Observational methods were particularly important because they allowed the study to compare formal organisational claims with observable workplace conditions.

Due to concerns regarding confidentiality and organisational sensitivity, many respondents were unwilling to participate in audio-recorded interviews. Consequently, detailed handwritten field notes were taken during and immediately after field interactions. A structured field diary was also maintained throughout the fieldwork process to document recurring observations, workplace conditions and comparative reflections across firms. The absence of audio recording may have limited verbatim documentation; however, reliance on field notes facilitated more open discussion among respondents regarding sensitive labour-related issues.

A pilot field exercise conducted in Bangalore Urban prior to the primary fieldwork helped refine the observational approach, interview structure and thematic focus areas used during the Haryana field visits.

Analytical Approach

The study employed a manual inductive thematic analysis approach based on an iterative review of field notes and observational records. An inductive analytical strategy was considered appropriate because the study aimed to identify recurring workplace patterns and organisational practices emerging from field observations rather than test predetermined hypotheses through rigid coding categories (Elo & Kyngäs, 2008; Pearson et al., 2025).

Following field visits, handwritten notes and observational records were reviewed repeatedly to identify recurring themes and comparative patterns across firms. The analysis specifically focused on differences and similarities between ZED-certified and non-certified MSMEs in relation to workplace organisation and social sustainability practices. During this process, recurring issues relating to occupational safety, informal human resource systems, welfare practices, working hours, contract labour management and organisational formalisation emerged consistently across field observations.

The analytical process involved manually grouping recurring observations and interview insights into broader thematic categories. Themes were refined iteratively through repeated comparison across field records and between certified and non-certified firms. This comparative review process helped identify patterns relating not only to the presence of workplace practices but also to the degree of organisational institutionalisation underlying such practices.

The use of thematic interpretation enabled the study to move beyond isolated workplace observations and identify broader structural patterns relating to social sustainability practices within MSMEs. The analysis further incorporated selected respondent quotations to strengthen contextual interpretation and illustrate recurring workplace experiences identified during fieldwork.

Ethical Considerations

Given the sensitivity associated with workplace practices, labour conditions and organisational disclosure, ethical safeguards formed an important component of the research process. Participating firms were provided with informed consent information sheets, consent forms and signed non-disclosure agreements clearly stating that neither firms' nor respondents' identities would be disclosed in any form. These measures were introduced to encourage candid discussion regarding workplace practices and organisational challenges.

To maintain confidentiality, firm identities were anonymised following data collection and replaced with numerical identifiers within field records. Respondents were also assured that the findings would be presented in an aggregated form without identifying individual firms or participants. Wherever possible, organisational claims relating to workplace systems and operational practices

were cross-checked through workplace observations and available organisational records in order to improve data reliability and reduce reporting inconsistencies.

The study remained attentive to issues of respondent comfort and voluntary participation throughout the fieldwork process. Participation was entirely voluntary, and respondents retained the right to decline the discussion of sensitive organisational matters during interviews.

The following section presents the findings emerging from a comparative field analysis of ZED-certified and non-certified MSMEs.

Findings

The findings indicate that while ZED certification contributes to greater procedural awareness and workplace documentation, its influence on deeper social sustainability practices remains uneven. Although certified firms generally displayed stronger visible compliance measures and better documentation systems, many labour-related practices remained weakly institutionalised and dependent on managerial discretion.

Occupational Safety and Workplace Compliance

Occupational safety was one of the few areas where visible differences emerged between certified and non-certified firms. ZED-certified MSMEs were generally more likely to display safety signage, maintain basic protective equipment and demonstrate awareness of workplace safety requirements. However, implementation often remained inconsistent.

In several certified firms, protective equipment was available but not regularly used during production activities. Safety compliance frequently depended on supervisory monitoring rather than embedded workplace behaviour. A supervisor from a certified fabrication unit stated:

> Workers wear safety gear when supervisors are around, but during busy hours many remove it because it slows the work.

Similarly, while fire extinguishers and emergency signage were commonly present in certified firms, workers in smaller enterprises often demonstrated limited awareness regarding emergency procedures. Non-certified firms generally displayed weaker safety systems with minimal visible safety arrangements beyond basic legal compliance.

These observations suggest that certification may improve visible safety compliance without necessarily producing deeper behavioural integration of workplace safety practices.

Informal Labour Systems and Uneven Welfare Practices

Human resource systems across many MSMEs remained weakly formalised. Although certified firms often maintained better attendance records and

workplace documentation, labour management practices continued to rely heavily on informal decision-making processes.

In several firms, leave approval, work allocation and wage-related decisions were handled directly by owners or supervisors without formal written procedures. A worker from a non-certified textile unit explained:

> If we need leave, we ask directly. Sometimes it is allowed, sometimes not.

Even within certified enterprises, documentation did not always translate into consistent workplace implementation. Some firms appeared to maintain records primarily for compliance purposes, while operational practices remained flexible and informally managed. An owner from a certified manufacturing unit remarked:

> We now keep records properly because certification requires it, but daily management still depends on practical situations.

The use of contract labour further fragmented workplace accountability. In many firms, outsourced workers received weaker welfare support and limited integration into workplace systems compared to permanent employees. A supervisor from a certified textile unit stated:

> Company workers receive benefits, but contract workers are managed separately by contractors.

Training practices also remained largely informal across both certified and non-certified firms. Most workers learned operational tasks through observation and direct supervision rather than structured training programmes. Similarly, formal inclusion or diversity initiatives were largely absent across the surveyed enterprises.

Overall, the findings suggest that although certification may encourage procedural formalisation, workplace welfare systems and labour protections remain unevenly institutionalised within MSMEs.

Documentation Without Deep Institutionalisation

One of the most consistent patterns emerging from the field evidence was the distinction between procedural documentation and substantive workplace transformation. Certified firms generally demonstrated stronger documentation systems, greater compliance visibility and improved workplace organisation compared to non-certified firms. However, many underlying labour practices remained informal and inconsistently implemented.

Several respondents acknowledged that certification encouraged firms to improve record-keeping and procedural organisation. A manager from a certified manufacturing unit stated:

> Before certification, many things were handled informally. Now at least records and procedures are more organised.

At the same time, the findings provide limited evidence that certification consistently transformed deeper organisational practices relating to labour welfare, working conditions or workplace accountability. Informal labour management, uneven welfare systems and flexible enforcement of workplace rules remained common even among certified firms. A comparative summary of the observed workplace patterns across certified and non-certified firms is presented in Table 4.

These findings suggest that the current structure of the ZED framework may strengthen procedural compliance and documentation practices more effectively than the institutionalisation of substantive social sustainability practices within workplace environments.

To further contextualise these findings, the following section benchmarks the ZED framework against selected international social sustainability frameworks and reporting systems.

Benchmarking ZED Against Social Sustainability Frameworks

The field findings suggest that while the ZED framework contributes to procedural formalisation and greater compliance visibility within MSMEs, its social sustainability provisions remain less operationally developed than those found in major international social sustainability frameworks. This becomes particularly evident when the framework is compared with systems such as SA 8000, ISO 26000, B Corp Certification, the ILO Better Work Programme and the BRSR framework in India.

A key difference lies in the use of measurable indicators and structured accountability mechanisms. International frameworks typically operationalise social sustainability through clearly defined standards relating to occupational safety, working conditions, labour rights, welfare systems, training practices and worker participation (Hofstad, 2023). Many of these frameworks also incorporate audits, reporting systems, grievance mechanisms or periodic assessments designed to monitor implementation and encourage organisational accountability. Table 5 summarises the comparative differences between the ZED framework and selected international social sustainability frameworks.

By contrast, the social sustainability provisions within ZED remain comparatively broad and weakly specified. Although the framework includes parameters relating to occupational safety, human resource management and workplace organisation, it provides limited operational guidance regarding implementation and evaluation.

This limitation was reflected during field interactions. Several respondents indicated that expectations relating to worker welfare and labour practices were less clearly defined than requirements relating to production systems or quality management. An owner from a certified engineering unit remarked:

> For quality and machines, the requirements are clear. For workers and welfare, it is more general.

Table 4. Comparative Patterns of Social Sustainability Practices Across ZED-certified and Non-certified MSMEs.

Social Sustainability Dimension	ZED-certified MSMEs	Non-certified MSMEs	Comparative Pattern	Institutional Interpretation
Occupational safety	Visible safety signage and basic PPE systems more common	Limited safety visibility and weak procedural systems	Certification improves visible compliance measures	Safety systems remain weakly embedded in workplace routines
Human resource practices	Better documentation and attendance records	Predominantly informal labour management	Formalisation improves at the procedural level	HR systems remain dependent on managerial discretion
Wages and leave	More structured leave practices in medium firms	Leave practices mostly verbal and informal	Some procedural improvement among certified firms	Welfare implementation remains uneven across firm sizes
Training practices	Limited structured training; mainly on-the-job learning	Informal skill transfer systems	Minimal distinction across groups	Skill development remains weakly institutionalised
Contract labour management	Welfare protections stronger for permanent workers	Similar fragmentation of labour accountability	Contract labour excluded from structured welfare systems	Outsourcing weakens organisational accountability
Working hours	Monitoring exists but extended hours during production peaks	Frequent informal extension of work hours	Production demands override formal systems	Operational pressures dominate labour regulation
Inclusivity and diversity	No formal inclusion systems observed	Similar absence of inclusion practices	Inclusivity remains largely absent	Social sustainability narrowly interpreted
Overall organisational Pattern	Stronger procedural documentation and compliance awareness	Informal and weakly documented systems	Certification improves procedural visibility	Limited transformation of deeper workplace practices

Source: Authors' fieldwork and thematic analysis (2025).

Note: The findings are based on qualitative field observations, open-ended interviews and a comparative thematic analysis conducted across 92 manufacturing MSMEs in Haryana.

Table 5. Comparative Benchmarking of ZED Against Major Social Sustainability Frameworks.

Social Sustainability Dimension	ZED Framework	International Frameworks (ISO 26000, SA8000, B Corp, Better Work, ETI)	BRSR Framework	Institutional Implication
Occupational safety	Basic compliance-oriented provisions	Structured safety systems with monitoring and audits	Safety disclosure requirements	Weak operational enforcement within ZED
Working hours	Limited operational guidance	Explicit working-hour standards and monitorin+g	Limited reporting requirements	Informal labour control remains unchecked
Wages and welfare	Broad welfare expectations	Measurable labour welfare and wage standards	Wage disclosure requirements	Lack of measurable welfare indicators
Human resource systems	Basic HR documentation focus	Structured labour governance systems	Employee reporting obligations	Procedural formalisation without deeper institutionalisation
Worker training	Weakly specified	Formal training and capability development systems	Partial reporting requirements	Limited organisational learning structures
Inclusivity and non-discrimination	Minimal emphasis	Explicit diversity and anti-discrimination standards	Gender and inclusion disclosures	Inclusion remains weakly operationalised
Contract labour accountability	Limited accountability provisions	Strong labour accountability mechanisms	Mandatory contract labour disclosures	Fragmented labour responsibility persists
Grievance mechanisms	Weakly defined	Formal worker grievance and participation systems	Disclosure-based accountability	Limited worker voice structures
Reporting and accountability	Limited documentation requirements	Strong audit and reporting systems	Structured mandatory disclosures	Weak monitoring and implementation consistency

Source: Authors' compilation based on ZED documentation, international social sustainability frameworks and BRSR reporting guidelines.

Note: The comparison focuses specifically on dimensions relating to workplace governance and social sustainability institutionalisation within manufacturing systems.

The comparison also highlights differences in accountability structures. Frameworks such as SA 8000 and the ILO Better Work Programme incorporate stronger mechanisms for monitoring labour conditions and workplace compliance. Similarly, the BRSR framework requires structured disclosure relating to employee welfare, contract labour, occupational safety and grievance systems. Such mechanisms create stronger organisational accountability for workplace practices.

The absence of comparable accountability structures within ZED may contribute to inconsistent implementation across MSMEs, particularly in highly informal industrial environments where workplace systems already depend heavily on managerial discretion. Under such conditions, certification may improve documentation and procedural visibility without necessarily producing deeper transformation in workplace practices.

Overall, the benchmarking analysis suggests that stronger operational guidance, measurable social indicators and clearer accountability mechanisms may be necessary if the ZED framework is to more effectively institutionalise social sustainability practices within MSMEs.

These comparative differences raise broader questions regarding the capacity of certification frameworks to shape workplace practices within highly informal MSME environments.

Discussion

The findings suggest that the ZED framework contributes more strongly to procedural formalisation than to the deeper institutionalisation of social sustainability practices within MSMEs. Certified firms generally demonstrated better documentation systems, greater compliance visibility and stronger awareness of workplace procedures than non-certified firms. However, many labour-related practices remained informal, inconsistently implemented and shaped by operational pressures and managerial discretion.

This pattern reflects a broader challenge associated with implementing social sustainability within MSME environments characterised by limited administrative capacity, informal labour systems and fluctuating production demands. In many firms, workplace management continued to prioritise operational flexibility and immediate production requirements over the development of structured labour governance systems. Under such conditions, certification alone may be insufficient to transform workplace practices unless supported by clearer operational standards and accountability mechanisms. These findings also suggest that the institutional effectiveness of certification systems may depend not only on the existence of standards but also on the organisational capacity of firms expected to implement them. In highly resource-constrained MSME environments, firms may prioritise visible compliance requirements that are easier to document and audit, while more complex labour-related practices remain unevenly implemented within everyday workplace operations.

The findings also indicate that broad sustainability expectations without measurable indicators may produce uneven implementation across firms. While ZED

encourages attention towards workplace systems and procedural organisation, the absence of clearly operationalised social sustainability indicators allows substantial variation in how firms interpret labour-related requirements. This may partly explain why visible compliance measures improved more consistently than deeper workplace practices relating to welfare systems, worker protection and labour accountability.

The widespread use of contract labour further complicated the implementation of social sustainability practices across both certified and non-certified firms. Responsibility for worker welfare was often fragmented across contractors and firms, limiting organisational accountability for labour conditions within production environments. The findings therefore suggest that social sustainability frameworks operating within MSME contexts must address not only direct employment practices but also the broader labour structures through which industrial work is organised.

At the same time, the findings indicate that certification may still function as an important mechanism for encouraging organisational formalisation within MSMEs. Several firms acknowledged that certification contributed to improved record-keeping, procedural organisation and greater awareness regarding workplace systems. However, the evidence suggests that stronger institutional mechanisms may be required if such procedural improvements are to translate into sustained workplace transformation.

Overall, the findings suggest that the effectiveness of social sustainability governance within MSMEs depends not only on the presence of certification systems but also on how labour-related expectations are translated into operational workplace practices. In highly informal industrial environments, broad sustainability commitments alone may be insufficient to produce consistent organisational change unless supported by clearer implementation standards and accountability mechanisms. The findings, therefore, indicate that the challenge is not only whether firms adopt certification systems but also whether such systems are capable of shaping everyday workplace practices beyond procedural compliance requirements.

Policy Implications

The findings suggest that strengthening the social sustainability dimension of the ZED framework requires clearer operational structures capable of supporting workplace-level implementation within MSMEs. However, given the financial and administrative limitations faced by many small enterprises, reforms must remain practical and adaptable to MSME operating conditions.

Introducing a Structured Social Sustainability Index

One of the major limitations identified in the study is the absence of measurable social sustainability indicators within the current ZED framework. Broad and weakly specified provisions allow inconsistent interpretation across firms, contributing to uneven implementation of workplace practices.

To address this gap, the framework could introduce a simplified Social Sustainability Index for MSMEs focusing on core indicators such as occupational safety practices, working hours, welfare provisions, training systems and grievance mechanisms. A phased structure could allow firms to gradually strengthen workplace systems across certification levels rather than imposing highly complex compliance requirements from the outset.

Such a system would provide a clearer operational direction for firms while improving consistency in certification assessment and workplace evaluation.

Strengthening Accountability for Contract Labour

The findings also highlight significant gaps in accountability relating to outsourced and contract labour systems. In several firms, contract workers operated under weaker welfare and safety arrangements than permanent employees, while responsibility for labour conditions was often shifted toward contractors.

The ZED framework could therefore incorporate clearer accountability provisions requiring firms to demonstrate minimum welfare and safety protections for all workers operating within production facilities, irrespective of employment classification. Even limited accountability requirements relating to safety access, welfare coverage and workplace monitoring could strengthen worker protection within labour-intensive MSME environments.

Together, these measures may help shift the social sustainability dimension of the ZED framework from broad procedural expectations towards more consistent workplace-level implementation practices.

Limitations

This study provides field-based insights into the social sustainability dimension of the ZED Certification Scheme; however, several limitations should be acknowledged.

First, the study is limited to manufacturing MSMEs located within selected industrial districts of Haryana. Workplace practices and organisational conditions may differ across other regions and industrial contexts within India.

Second, the study adopts a qualitative interpretive approach based on field observations, open-ended interviews and handwritten field notes. Although this approach enabled contextual understanding of workplace practices and encouraged an open discussion among respondents, the absence of recorded interviews may have limited the capture of complete verbatim responses.

Third, despite the use of a matched comparative framework, the study cannot eliminate the possibility of selection bias arising from unobserved organisational characteristics such as managerial orientation or prior commitment to formalisation practices. The findings should therefore be interpreted as comparative rather than causal.

Finally, the study captures workplace conditions during a specific period and does not examine how organisational practices evolve over time. Future research may adopt longitudinal approaches or incorporate quantitative validation across larger MSME samples and regional contexts.

Conclusion

This study examined the social sustainability dimension of the ZED Certification Scheme through comparative field-based evidence from manufacturing MSMEs in Haryana. By comparing ZED-certified and non-certified firms, the study explored how social sustainability practices are implemented within workplace settings and assessed the extent to which the framework contributes to the institutionalisation of labour-related practices within MSMEs.

The findings suggest that while ZED certification contributes to greater procedural awareness, workplace documentation and visible compliance measures, its influence on deeper workplace practices remains limited. Certified firms generally demonstrated stronger procedural systems than non-certified firms; however, labour management practices, welfare arrangements and workplace accountability structures often remained informal and unevenly implemented.

The benchmarking analysis further showed that international social sustainability frameworks typically rely on measurable indicators, monitoring systems and accountability mechanisms that are less developed within the ZED framework. This difference may partly explain why certification appears more effective in improving procedural compliance than in encouraging deeper workplace transformation.

At the same time, the findings suggest that certification frameworks such as ZED may still play an important role in encouraging organisational formalisation and greater awareness regarding workplace systems within MSMEs. However, stronger operational guidance and accountability structures may be necessary if the framework is to more effectively support the institutionalisation of social sustainability practices.

The study therefore suggests that strengthening the social sustainability dimension of the ZED framework may require greater emphasis on measurable workplace indicators and labour accountability mechanisms, particularly in relation to welfare systems and contract labour arrangements. Such reforms may improve the consistency of workplace-level implementation while remaining sensitive to the operational realities of MSMEs.

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Book Review

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Jonathan Haidt, *The Anxious Generation: How the Great Rewiring of Childhood Is Causing an Epidemic of Mental Illness*, 2024, 385 pp., ₹.999. Penguin Random House, ISBN: 978-0593655030

Introduction

In recent years, concerns regarding mental health issues among young people have increased as a result of technological changes. Increased rates of mental disorders, including anxiety, depression, and other illnesses, have grabbed the attention of many researchers and practitioners who are investigating possible causes of this phenomenon. This interest has resulted in many studies being conducted to help explain the cause-and-effect relationship that exists (Keles et al., 2020; Twenge et al., 2018). A recent work on this topic is *The Anxious Generation*, written by Jonathan Haidt, which tries to explain what happened using the idea of old-fashioned play versus modern technology as a basis for understanding modern development as the 'great rewiring of childhood'.

Haidt argues that the movement away from play-based (i.e., play-based, social-based) childhood to childhood that revolves around cellphones and screens has created developmental consequences that are still being felt today in all parts of life where there are significant developmental milestones. He claims that these changes have negatively impacted important developmental milestones, including socialisation, emotional development, and creating one's identity. While Haidt's ideas resonate with common societal concerns regarding technology, the research that was conducted raises new questions regarding the subject of technology and its impact on children.

This review evaluates the ideas contained in Haidt's book. Evaluation will be based on identifying whether or not there are any advantages or disadvantages to the study being conducted. Furthermore, the review will provide a theoretical framework for Haidt's claims and examine their validity.

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Overview of the Book

The Anxious Generation tells a story about the relationship between the increasing mental issues experienced by young people and the proliferation of smartphone usage and social networking services in their lives since the beginning of the 2010s. According to Haidt, these are the years when children became increasingly exposed to the adverse effects associated with always being online.

In his analysis, Haidt compares the two concepts—the 'play-based childhood' and the 'phone-based childhood'. While the former involves children playing outdoors with friends and exposing themselves to various risks as a way of becoming socially competent, the latter makes them spend most of their time interacting online, which results in a number of problems, such as a lack of communication with peers and disrupted sleep (Gray, 2011; Levenson et al., 2017).

Additionally, the author provides some insights into how digital technology affects children differently depending on their gender. For girls, social media poses a bigger threat because they tend to experience more relational aggression and bullying, while boys are more likely to isolate themselves in the online world, engaging in solitary activities such as playing video games (Livingstone & Smith, 2014; Viner et al., 2019). The book finishes with several proposals for policymakers regarding children's internet use.

Theoretical Framing

Although Haidt's study does not directly draw upon one specific theoretical model, it may be explained based on several existing perspectives.

First, the displacement hypothesis implies that time spent engaging with digital gadgets and screens replaces participation in developmentally enriching behaviours, such as physical play and communication. Haidt's concern about the decrease in unstructured play matches this approach (Gray, 2011; Przybylski & Weinstein, 2017).

Second, the perspective of social comparison theory helps explain the different effects of social media on different categories of teenagers. It may explain how upward social comparisons made online impact girls' self-image (Keles et al., 2020; Twenge et al., 2018).

Third, ecological systems theory suggests that the process of development is influenced by several environmental systems and their interactions. In this context, Haidt's focus on technology is too limited, as it fails to incorporate various contexts in adolescents' lives.

Lastly, the knowledge accumulated within the field of developmental psychology implies that peers play a significant role in adolescent behaviour. This fact supports the thesis advanced by Haidt, who considers overprotective parents and an underregulated online environment to undermine adolescents' growth process.

Critical Analysis of Key Arguments

Correlation Versus Causation

One of the principal ideas put forth in *The Anxious Generation* is that the increasing use of cellphones causes rising levels of adolescent psychological problems. Even though there are examples of correlational evidence provided by Haidt throughout his article, the research findings he uses to support his claims are mostly correlational in nature (Orben & Przybylski, 2019; Przybylski & Weinstein, 2017).

This is important because, as research has shown, the correlation between the use of electronic gadgets and the psychological state of adolescents is weak. Weak correlations imply that there are other variables involved in the process. Furthermore, it can very well happen that young people who experience psychological issues spend a lot of time on their phones (Odgers & Jensen, 2020; Orben & Przybylski, 2019).

In order to provide more convincing evidence, Haidt should rely on longitudinal and experimental research, which helps identify causation.

Gendered Experiences of Digital Media

One of the most interesting discussions in the book is about gender differences. According to Haidt, girls are especially sensitive to the harms caused by social media because they are more sensitive to social criticism and interpersonal relationships. Scientific studies show that teenage girls suffer from anxiety and depression more than boys (Keles et al., 2020; Twenge et al., 2018).

There is still an incomplete analysis in the social media realm. When discussing social media, one only discusses the platforms' design and the social comparison aspect. Aspects such as sociocultural background, gender norms, body-image pressures, and the drive for success are typically ignored in this analysis. Each of the above existed before the creation of social media, so the impact of each on social media cannot be ignored.

The same can be said for boys using computer games. The digital world can provide boys with an avenue for communication as well as a way to develop or explore themselves (Montag et al., 2019).

Decline of Play and Developmental Implications

This focus on the loss of unstructured play from Haidt's perspective highlights a very valid point when it comes to the development of children. Unstructured play has been seen as a fundamental source for acquiring skills such as social skills, emotional management, and resilience (Gray, 2011).

The exact level to which this change occurs cannot be determined because the nature of play itself varies across different cultures and socio-economic backgrounds, and sometimes children still have peer interaction even though there has been greater exposure to technology. The link between a lack of play and the development of psychological problems may also involve many factors.

Despite the theoretical justification of this point, further evidence needs to be provided for it to gain traction.

Evaluation of Empirical Evidence

The author's research integrates various sources across disciplines such as psychology, sociology, and public health, which is one of the main strengths of the book under consideration. However, there are several drawbacks regarding the selection and analysis of evidence used. First, cross-sectional studies do not allow for establishing causality. Second, there is a potential for response bias and other errors when estimating self-reported data concerning adolescents' media use and mental health. Third, the heterogeneous nature of experiences associated with digital technologies is frequently ignored (Best et al., 2014; Odgers & Jensen, 2020; Orben & Przybylski, 2019).

According to some recent meta-analyses, the effects of using digital technologies are rather complicated. They include both negative and positive effects of media usage on adolescents. The author's focus on negative consequences could be considered controversial since it does not give a comprehensive view of the problem (Best et al., 2014; Orben & Przybylski, 2019; Przybylski & Weinstein, 2017).

Contextual Limitations: A Global Perspective

The main drawback of this book lies in its emphasis on the Western world. It should be noted that this aspect does not make the results presented in it less relevant, but rather makes one question their transferability to different socio-cultural contexts.

For instance, in developing countries like India, technology adoption is influenced by other cultural factors. The stability of the family, collectivism, and parental control might alleviate certain negative effects of technology use. However, there are other psychological pressure sources, including economic insecurity, fierce educational competition, and societal expectations. There are a few more problems, such as shared devices, the digital divide, and digital illiteracy, that make the connection between technology and mental health even more complicated. Thus, taking a global perspective might enrich Haidt's theory.

Policy and Practical Implications

A major theme in the book is that recommendations like the ones Haidt gives for promoting well-being are good recommendations; however, implementing these recommendations into practice is difficult because it requires the cooperation of several individuals. It will be increasingly difficult for parents to not allow their children to have smartphones until they are older, only allow them to use social media, and forbid them from using their phones in schools, because more and more children are using the internet in both educational and social settings.

Technological recommendations will not account for additional issues like academic stress, socio-economic conditions, and access to mental health resources, which provide barriers to implementing the recommendations made by technology (Livingstone & Smith, 2014; Odgers & Jensen, 2020).

Discussion

The Anxious Generation effectively conveys a very significant and complex issue. The book tells a riveting story, includes an accessible review of existing literature, and ends with a persuasive call to action; however, the way it defines anxiety in adolescents is limited because it primarily attributes the root of adolescent anxiety to technology.

Future researchers should broaden their lens of exploration with respect to adolescent mental health by including economic, cultural, and organisational perspectives. While digital technologies play an instrumental role, they function in certain systems that contribute to their effect (Odgers & Jensen, 2020).

Further research should include studies that take a long-term perspective and incorporate a cross-cultural approach to address this question. Moreover, it should emphasise the diverse nature of adolescents' interactions with technology (Best et al., 2014; Odgers & Jensen, 2020).

Conclusion

All things considered, it must be said that the book under analysis makes a notable contribution to current discussions about youth's mental well-being. Indeed, the very idea that changes in children's lives caused by the digital age can have significant psychological effects is a highly intriguing one and requires careful thought. Further, the arguments made in the book need to be approached with some degree of scepticism since, although the author brings forward many possible dangers of growing up online, he fails to consider the intricacy of the situation and resorts to a technologically deterministic outlook (Best et al., 2014; Odgers & Jensen, 2020; Orben & Przybylski, 2019).

On the whole, however, Haidt's writing can be considered productive insofar as it provokes critical discussion and research.

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