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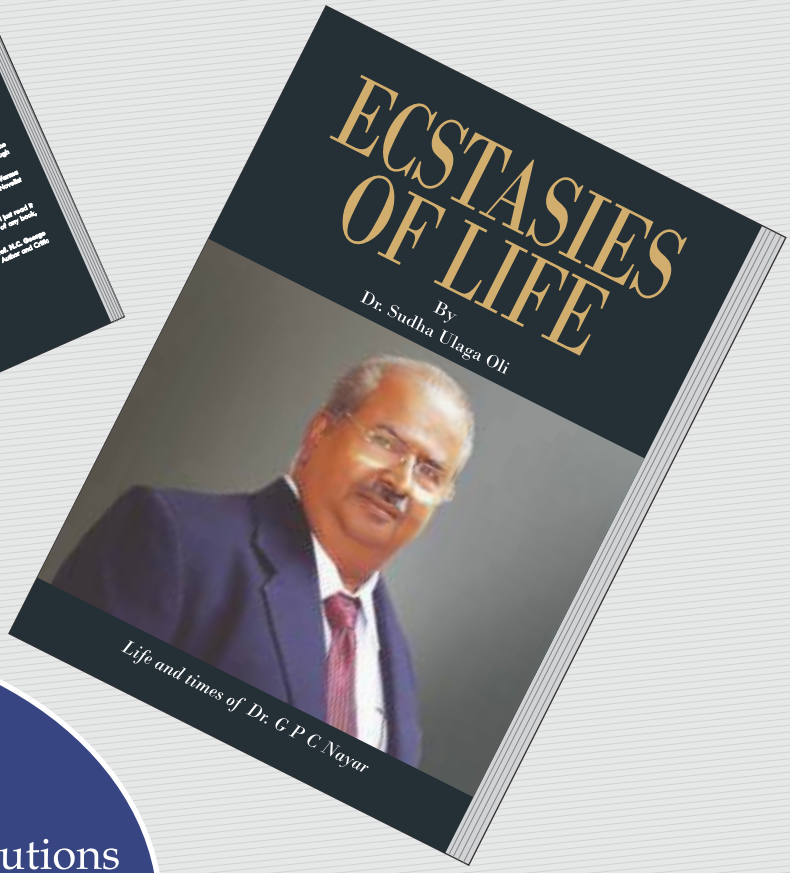
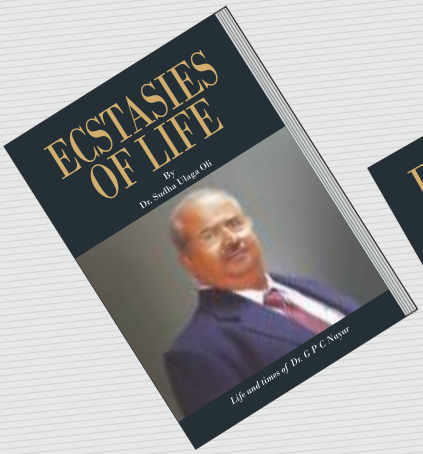
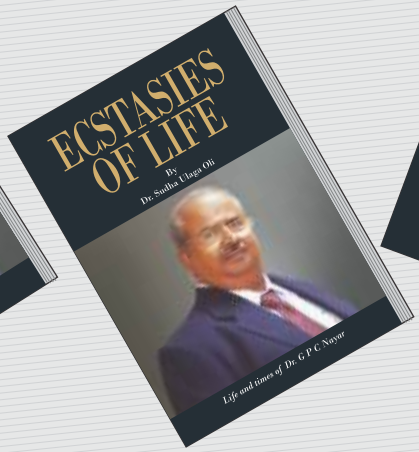


Here's an entrepreneur
who has created
some excellent academic institutions
in an unfriendly environment.
It is a saga of trials and tribulations
in an extremely readable manner
by a consummate
writer in English.





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October - December 2024, Vol. XXI, Issue No. 4

Articles

Chairman's Overview

Navigating Job Displacement in the Age of AI

The fourth industrial revolution, driven by artificial intelligence (AI), is reshaping industries at scale. From finance and logistics to customer service and HR, AI-powered systems are streamlining operations and reducing costs. But beneath this progress lies a growing concern—AI-induced job displacement.

AI's efficiency in automating routine, rule-based tasks has led to a visible reduction in clerical, support, and mid-level decision-making roles. In India, the impact is already evident. Tata Consultancy Services recently laid off over 12,000 employees, citing redundancy in roles amid accelerated AI integration. Fresher hiring in tech has dropped by over 50% since 2019. Globally, the shift is even sharper. Ford CEO Jim Farley warns that AI could eliminate half of all white-collar jobs. BT Group's CEO has committed to cutting 10,000 jobs through AI by 2030. Over 27,000 U.S. jobs have already been cut due to AI since 2023.

For businesses, AI must be deployed with a strategy that includes workforce adaptation, not just cost-cutting. Companies will need agile talent capable of redesigning roles, managing change, and fostering innovation. This presents a defining moment for management education. B-schools must urgently realign their focus—shifting from static technical training to dynamic, interdisciplinary learning. Courses must integrate AI strategy, digital ethics, algorithmic bias, change management, and human-machine collaboration. Importantly, experiential learning through live projects with AI-integrated firms will help students build confidence navigating ambiguity.

Leadership programs must also train students to manage hybrid teams—where humans and AI systems work side by side. Understanding how to lead with empathy, interpret AI-driven insights responsibly, and uphold ethical accountability will be key differentiators. In the age of AI, human skills—critical thinking, creativity, ethical judgment, and emotional intelligence—gain renewed importance. Business leaders of tomorrow must not only understand AI but also champion inclusive innovation. India's demographic dividend offers an edge, but only if harnessed through forward-looking education and policy. B-schools must rise to this challenge—not merely reacting to disruption, but actively preparing leaders to thrive in it.

Dr. G. P. C. NAYAR
Chairman, SCMS Group of Educational Institutions.

SCMS Journal of Indian Management

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Editorial

This issue of the *SCMS Journal of Indian Management* presents nine thought-provoking papers that explore critical themes shaping business, finance, and human behaviour in today's complex environment. The issue opens with an analysis of market efficiency in the Indian stock market, focusing on before and during the COVID-19 period. Using event study methodology, the paper offers valuable insights into investor behaviour and market anomalies.

The subsequent paper presents a thematic literature review that explores how digitalization is redefining customer value. Organised into four core themes, the review proposes an integrative framework to guide future research and practice in marketing, customer experience, and value co-creation in digital environments.

The next study presented undertakes a comprehensive examination of message strategies in promoting green consumer behaviour. Using bibliometric and TCCM analysis, it maps the evolution of sustainability communication and proposes a framework to enhance the impact of messaging on behavioural change.

The role of integrated reporting in enhancing firm value is investigated through a multi-year study of listed Indian firms in the next contribution. The findings demonstrate that firm characteristics such as size and age moderate this relationship, offering implications for investors, regulators, and corporate managers.

The next paper investigates the influence of family financial socialisation on students' financial behaviour, highlighting the mediating roles of financial education and attitude. This contributes to the growing discourse on financial literacy among youth.

Another contribution explores informationally dominant firms in India, comparing their returns performance and earnings behaviour with satellite firms. The use of Random Forest Method enhances its predictive insights for investors.

Research on IT employees examines how psychological capital influences affective commitment. Insights from the paper offers a pathway to addressing high attrition through a focus on employee wellbeing.

A comprehensive study on healthcare workers identifies collective loneliness as a significant predictor of anxiety and depression. The paper contributes to highlighting the need for robust social support systems in crisis settings.

Finally, a behavioural finance paper focuses on working women investors, revealing how biases such as loss aversion and herding influence financial risk tolerance.

Together, these studies offer a comprehensive view of emerging challenges and opportunities in management practice and theory.

We wish our readers a fulfilling reading experience!

Dr. Radha Thevannoor

Pandemic Shock and Market Efficiency: Impact on India's Stock Market

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Abstract

The essence of this study is to examine market efficiency by pursuing two research objectives: to investigate anomalies in size and value effects before and during the COVID-19 crisis and to examine market reactions to various announcements related to COVID-19 on stock returns using the event study methodology. The study presents a comprehensive analysis of the Indian equity market efficiency for 21 years, including before and during the crisis period, using data from the Indian market (BSE 500 Index) as it is one of the fastest growing economies. It also evaluates the impact of announcements on portfolio returns based on financial characteristics and identifies the main drivers influencing returns of various events.

The results show that value investing appears to be on the wane, and it has negative effects on size control. The proclamation of the pandemic triggered a massive market slump that caused Indian stock markets to suffer economic losses of 27%. This study's results are useful for investors, policymakers, and the government. Leverage, liquidity, value, and profitability are confirmed as drivers of cumulative abnormal returns (CARs), which are crucial factors that investors and fund managers need to consider. This novel work not only adds to the stock market literature but also presents the tests of the Indian market's efficiency by adding the dynamics of stock market anomalies, pre- and during the COVID-19 period, and the key economic events that occurred post-COVID-19 by covering a considerable sample period of 21 years. This original study covers the latest observations for the Indian market and attempts to reform it.

Keywords: Market efficiency**,** financial anomalies; announcements; event study; leverage; size; abnormal return; value; market reaction

1. Introduction

The efficient market hypothesis (EMH) states that stock prices in an efficient market reflect all information; therefore, no trading strategy can lead to above-average profits. However, return patterns and investor behaviour over time have highlighted the shortcomings of these models. Patterns that contradict EMH's assumptions are considered to be market anomalies. These anomalies challenge the EMH for reasons such as randomness of stock prices, abnormal returns, rapid information and rationality of investors. The detection of calendar anomalies such as the January effect (Rozeff & Kinney, 1976), the Turn-of-the-month effect (Lakonishok & Smidt, 1988) and the Monday effect (French, 1980) calls into question the random movement of prices. It confirms the presence of returns patterns in specific periods. Similarly, studies show that behavioural biases in explaining abnormal returns are linked to investors' sentiment, which can be explained by a tendency to react too quickly or too slowly to news, driven by irrational behaviour (De Bondt & Thaler, 1985; Bernard & Thomas, 1989; Stambaugh et al., 2011; Hirshleifer, 2001). Financial anomalies rely on empirical tests to reject the null hypothesis that the securities market is efficient (Kuhn, 1970). The consistency of the return patterns tracked in the cross-sectional and time-series data led to identifying suspicious anomalies. This has led to a paradigm shift in asset pricing models as the Capital Asset Pricing Model (CAPM) explains an asset's expected returns based on its likely risk distributions. Of the various anomalies, the effects of size and value are widely observed and confirmed to be the most robust, analogous to different periods in the stock markets. The size effect implies that small stocks earn higher risk-adjusted returns than large stocks do, suggesting that small stocks outperform large stocks. Banz (1981) first traced the size effect, followed by Roy and Shijin (2019). Similar to the size effect, the value effect highlights that the company should fundamentally be strong. This implies that stocks with a high book-to-price ratio earn higher risk-adjusted returns than those with a low book-to-price ratio, suggesting that stocks with a high book-to-price ratio will outperform. The anomaly of value effects attracted the attention of Graham and Dodd (1951), and later, it was examined by Fama and French (1992, 1996). Lakonishok et al. (1994) document the value effect on stock markets worldwide over different time horizons.

Furthermore, few other competing theories explain the findings of these market anomalies and challenge the EMH. In support of the behavioural finance theory, Chandra (2008) argues that investors are irrational in their investment decisions, driven primarily by greed and fear, cognitive dissonance, heuristics, mental accounting, and anchoring. Hence, financial investment and financial professionals should incorporate these behavioural factors while framing investment strategies. Likewise, Singh et al. (2016) surveyed 521 male and female retail investors, revealing a significant gender bias in behavioural biases like regret avoidance bias, overconfidence bias and self-attribution bias while making investment decisions. The study contradicts the classical theory of investment. In evidence for the arbitrage pricing theory (APT), Dhankar and Singh (2005) find that the arbitrage pricing theory, with multiple factors, is an overperformer model for measuring risk and returns compared to the CAPM. Similarly, Yadav and Hegde (2021) support the APT theory in explaining corporate returns, as macro variables included in the APT significantly impact the risk of assets and thus guide investors in explaining stock price movement.

Today, the financial crisis is an integral part of our lives. The impact of a global crisis or a conflict between two countries impacts the rest of the world. Of so many crisis periods, COVID-19 has been one of the greatest crises that has affected the entire world in all contexts. However, given the recent pandemic COVID-19 (WHO, 2020)[1] this appears mysterious. The novel coronavirus, which originated in Wuhan, China, in December 2019, is impacting the global economy (Zhang et al., 2020). On March 11, 2020, the WHO declared it a global pandemic, and since November 14, 2021, it has spread to 222 countries and territories around the world, with 253,797,421 (200 million) confirmed cases and 5,113,268 deaths worldwide.[2] This has forced governments worldwide to impose various restrictions on public movement. Key restrictions include home quarantine, social distancing, isolation, contact tracing, testing, and face masks in public places. These pandemic-related factors have disrupted and paralyzed the global economy, resulting in unemployment, market instability, GDP decline, economic activity loss, and financial crises. COVID-19 caused an unprecedented economic downturn and proved more severe than the global financial crisis 2008 (Barrafrem et al., 2020). Since the epidemic (COVID-19) is an unprecedented event that has never happened before, the information about its impact is enormous and continuous. It would be interesting to examine how stock markets have absorbed this flow of information, especially in emerging markets. Studies examining the impact of COVID-19 on market efficiency have reported mixed results at global and local levels Akhtaruzzaman et al. (2021) in China and G7

countries; Al-Awadhi et al. (2020) in China; Sansa (2020) in China and the USA; Rahman et al.(2020) in Australia; Mirza et al. (2020) in Europe; Czech et al. (2020) in Europe; Ceylan et al. (2020) in several countries; Chaudhary et al. (2020) in international markets; Ashraf (2020) in several countries). These empirical studies report on the significant impact of COVID-19 on the efficiency of financial markets. In this context, it is postulated that COVID-19 has influenced share prices and, thus, stock market efficiency. This may be more pronounced in emerging market equity markets, where various anomalies have been observed. The persistence of size and value effect anomalies indicate market inefficiency could benefit portfolio managers.

Before the COVID-19 report, the Indian market showed mixed results regarding prevalence of anomalies. Maheshwari et al. (2017) confirm that the momentum effect is very much present in the Indian stock market and is not a manifestation of a factor controlled by size, value and illiquidity. The study used a sample size of 470 companies listed in the BSE database for 1997-2013. However, Sharma et al. (2019) revisit the size, value, volume and momentum anomalies for the Indian market for the period 2005-2016 and find that size and momentum continue to provide significant returns but declined in comparison to past returns over time, which the dissemination of information may justify. Similarly, Nemani et al. (2023) show a more significant effect of the month's turn for small indices than large indices for the study period 2007-2023. Institutional investors are more likely to be found trading on the first day of the month, but domestic investors do not.

Furthermore, few studies have examined the impact of COVID-19 on Indian stock markets. Verma et al. (2020) used the same model and showed that COVID-19 cases do not impact NSE indices stock market returns. However, they report a positive impact on the conditional variance for Nifty 50 returns. Rao et al. (2020) conducted a sectoral analysis using the event study methodology and reported the breakdown effects on different industries. Sahoo (2021) found that Monday stock returns are negative during COVID-19 but positive pre-COVID-19. However, Tuesday's returns are positive and statistically significant for the Nifty indices during COVID-19. Mittal and Sharma (2020) report significant abnormal and cumulative returns for the healthcare and pharmaceutical sectors. Chaudhary et al. (2020) report that Indian markets have roughly the same standard deviation but are negatively skewed compared to global markets. They have exhibited high positive kurtosis, making them more volatile. Khurshid (2020) finds that FFTFM and FFFFM perform better than CAPM in the Indian stock market; additional size and value factors have significant explanatory power for variations in average returns. Existing literature suggests that COVID-19 has hit Indian stock markets in different ways.

An efficient market offers no opportunity for abnormal returns; therefore, there are no market anomalies. An efficient market assumes that investors are rational and that there are no under- or overreactions to announcements/new information. Although it is difficult to offset the effects of the pandemic, the Indian government has made various announcements to stimulate the economy. Due to the dynamics of the Indian financial market, it is imperative to study the impact of such announcements on the efficiency of the Indian stock market.

COVID-19 has the greatest impact of so many crises, so the data collected for this study is related to the COVID-19 crisis. Hence, this study examines the efficiency of the Indian stock markets during COVID-19 for two reasons: First, India is the second hardest-hit country in the world after the US,[3] as India is the hardest-hit country in Asia (COVID-19 cases: 34,437,307; deaths: 463,530)[4] as of November 14, 2021, and second, India ranks prominently with a market capitalization of US$ 2.8 trillion (rank eighth) and acts as a catalyst for the country's[5] economic development worldwide. The impact of COVID-19 on the Indian stock markets can be seen in the Sensex hitting a 10% lower limit on two different trading days in March 2020. On March 23, 2020, there was a 13.2% decline in the Sensex. Hence, it would be interesting to examine the impact of COVID-19 on Indian stock markets. The essence of this study is to examine the market efficiency by pursuing two research objectives, i.e. to investigate anomalies in size and value effects before and during the COVID-19 crisis and to examine market reactions to various announcements related to COVID-19.

The remainder of the paper is organized as follows: Section 2 explains the dataset and methodology, Section 3 discusses the empirical results, and Section 4 concludes the study.

2. Data and Methodology

2.1 Size and value effect anomalies

The companies included in the BSE 500 Index form the sample to investigate the presence of size and value effect anomalies (Chaudhary, 2021). The BSE 500 index represents 93% of the total market capitalization and includes the 500 largest companies in India. Due to unavailability of data, the monthly closing prices, market capitalization, and P/B of 280[6] companies are taken for study.

From April 2002 to March 2023, companies are extracted from the Center for Monitoring Indian Economy (CMIE) database. Data is collected for both before and during the COVID-19 crisis to examine for anomalies in size and value effects before and during the COVID-19 crisis. Market capitalization is used as an indicator of size, and P/E ratio as an indicator of value. Companies are sorted at the end of April for each year (Lal, 2016), and value-weighted log returns (Deb & Mishra, 2019) are calculated for portfolios in the first and last quartiles (Lakonishok et al., 1994). BSE Sensex is used as a market proxy, and RBI's 91-day T-Bills as a risk-free rate.

The Welch's t-test examines the significant differences in returns between the size and value portfolios. In addition, a market model is applied to study the returns of size value-controlled portfolios (Israel et al., 2020; Clark & Qiao, 2020). The event study methodology examines the impact of positive and negative announcements on stock returns (Rahman et al., 2021). Various statistical tests are used to check robustness. Additionally, factors based on financial characteristics (value, profitability, liquidity, and leverage) are identified as drivers of abnormal returns in various events. This is one of the few studies that offers a comprehensive analysis of the efficiency of the Indian stock market before and during the COVID-19 crisis. This study contributes to the current literature on market efficiency, market anomalies, market event announcements, and drivers of abnormal returns.

To maintain the normality assumption, Welch's test is used to determine the significant difference between the mean returns of the different portfolios using the following formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1^2} + \frac{S_2^2}{N_2^2}}}$$

Where,

μ_1 is the sample mean with a standard deviation of s_1 and a sample size of n_1.

μ_2 is the sample mean with a standard deviation of s_2 and a sample size of n_2.

We apply the following market model to investigate the presence of size and value anomalies (excess returns relative to the market portfolio).

$$R_{pt} - R_{ft} = \alpha_t + \beta\,(R_{mt} - R_{ft}) + \varepsilon_t \quad \ldots\ldots\ldots\ldots \quad (2)$$

The market model is used because it is widely used in the industry, is easy to understand, and only takes systematic risks into account.

2.2 COVID-19 related announcements

To study the impact of COVID-19-related announcements on Indian stock markets, the selected sample companies remain the same as those in Section 2.1. The dates of the events are two negative and two positive COVID-19 announcements. There are many announcements, such as stock splits, company-specific announcements, etc., but the top two market-specific announcements are analyzed. Hence, two WHO announcements were adopted for the study: COVID-19 as a public health emergency on January 30, 2020 (1st adverse event) and as a pandemic on March 11, 2020 (2nd adverse event) for the study. These two events are used to consistently compare, as the WHO declared that these two adverse events affected most countries. Similarly, two positive announcements from the Indian government are adopted instead of company-specific events. The first positive event was the announcement of the first Stimulus Package worth Indian Rupees 20 trillion by the Prime Minister of India on May 12, 2020. The second positive event is the announcement of 350 billion Indian rupees for the COVID-19 vaccination program by the Indian Union Finance Minister on February 1, 2021. These two events are included to ensure consistency of comparison as the Government of India declares these two positive events. For ESM, an estimation period of 250 days (a full trading year (Rahman et al., 2021)) is used, ending 50 days before the first event date. To calculate the cumulative average abnormal returns (CAARs), consider an event period of five days before and after the event date (see Fig. 1). The period is limited to five days to limit the disruptive effect. The robustness of the ESM is checked by using another estimation period of 150 days ending 20 days before the date of the first event (see Fig. 2). The market models for measuring abnormal returns (AR) and CAAR are as follows Loipersberger (2018):

$$AR_{i,t} = R_{i,t} - \hat{\alpha_i} - \hat{\beta_i}\, R_{m,t} \quad \ldots\ldots\ldots\ldots \quad 3$$

$$CAAR = \sum_{t=1}^{n} AR_t \quad \ldots\ldots\ldots\ldots \quad 4$$

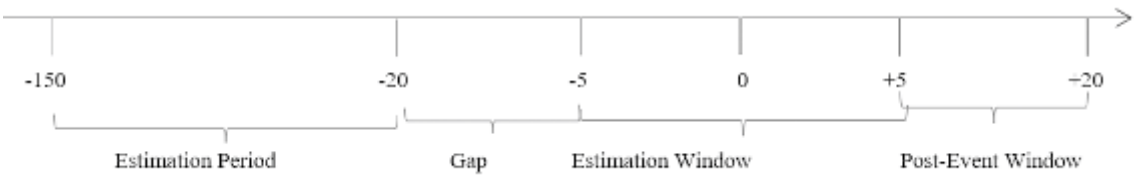
Where $AR_{i,t}$ = abnormal returns of an individual stock

$R_{i,t,}$ and RM_t = actual realized returns of individual stocks and the aggregate market index

$\hat{\alpha}i$ and $\hat{\beta}i$ = estimated parameters

Source: *Computed by authors*

Figure 1. Event with Estimation period of 250 days



Source: *Computed by authors*

Figure 2. Event with Estimation period of 150 days

Fama and French (2015) identify anomalous portfolio return patterns based on size, value, investment, and profitability. Since the event study is performed for the announcements, the study is further extended by calculating the CAAR for Fama-French factors. However, the study is limited to the analysis of only three factors: total assets (size), P/E ratio (value), and growth in total assets (investments). The portfolio construction is limited to size, value and investments. However, the left factor, i.e. the profitability, is used as an independent variable for the regression analysis. Following the methodology described in section 2.2, portfolios are sorted into small and large (lowest and highest 70 stocks by size), value and growth (highest and lowest 70 stocks by P/B ratio), and conservative and aggressive (lowest and highest 70 stocks by investment). In addition, this study examines the drivers (independent variables) of the realized cumulative abnormal returns (CAR) (dependent variable), similar to Rahman et al. (2021). Financial factors, namely size, value, leverage (Fama-French, 1992), and profitability (Fama & French, 2015), are considered independent variables as studied variables contributing to asset pricing worldwide. The following regression equation is used:

$$CAR_{i,[\tau1;\tau1]} = \beta0 + \beta1Liquidity + \beta2Value + \beta3LEVERAGE + \beta4PROFITABILITY + \varepsilon i \quad \text{.....(5)}$$

3. Empirical Results

Table 1 summarizes the results of Welch's test for value and growth portfolios. Companies in the first quartile are value portfolios (lowest PB ratios), while companies in the last quartile are growth portfolios (highest P/B ratio). In 13 of the 18 years (April 2002 to January 2020) before the Covid-19 pandemic, differential returns for value portfolios are significant. Although the 2008-2010 financial crisis is included in this period, the study uses uninterrupted time series to present a comprehensive picture of the Indian market. This shows their outperformance compared to the growth portfolios in the study period. The value portfolios also achieved significant outperformance during the whole COVID-19 period (February 2020-March 2023). The results of Welch's test confirm the outperformance of the value portfolios, and the robustness of these results is further verified by applying an OLS regression. The risk-adjusted returns for the value and growth portfolios are regressed onto the Sensex returns for both periods. Table 2 shows the significant negative abnormal returns (alpha) during the pre-COVID-19 period for the growth portfolio.

Furthermore, the insignificant alpha for both value and growth portfolios during COVID-19 confirms no value effect in the Indian market. Additionally, the effects of value and size strongly correlate with stock returns (Scislaw, 2015). Hence, to control for the influence of size, the average

Table 1. Returns for Value and Growth Portfolios

Year	Value	Growth	t-statistics	Outperformer
2002	0.016	-0.025	(2.145*)	Value
2003	0.084	0.035	(2.101*)	Value
2004	0.032	-0.015	(2.101*)	Value
2005	0.028	0.016	(2.086*)	Value
2006	-0.013	-0.024	(2.093*)	Value
2007	0.003	-0.014	(2.145*)	Value
2008	-0.059	-0.084	(2.086*)	Value
2009	0.066	0.009	(2.131*)	Value
2010	-0.005	-0.023	(2.086*)	Value
2011	-0.030	-0.027	(2.145*)	Growth
2012	-0.032	-0.001	(2.145*)	Value
2013	0.000	-0.001	(2.160*)	Value
2014	-0.018	0.015	(2.160*)	Growth
2015	-0.009	-0.016	(2.120*)	Value
2016	0.013	-0.002	(2.086*)	Value
2017	-0.021	-0.008	(2.179*)	Growth
2018	-0.018	-0.016	(2.086*)	Growth
2019	-0.037	0.000	(2.201*)	Growth
2020	0.024	0.008	(2.110*)	Value
2021	0.013	0.003	(2.200*)	Value
2022	0.013	-0.010	(2.200*)	Value
2023	0.021	0.012	(2.160*)	Value

*Notes: Table 1 shows the results of Welch's test for value and growth (P/B ratio) quartile portfolios. The t-statistics are within parentheses. * Indicates statistical significance at the 5% level.*

Source: *Computed by authors*

returns of small and large portfolios are subtracted from the value and growth portfolios, respectively. Size-controlled value and growth portfolios significantly underperformed the market in the pre-COVID-19 period. The same result occurs for a size-controlled value portfolio; thus, the results do not support the existence of a value effect anomaly. Consistent with, it turns out to be negative when the size factor is controlled. This implies the presence of certain common factors (characteristics) between size and value effects, and an examination of these factors can point to their respective causes. The results conclude no value effect anomaly, although value stocks outperformed throughout the study period.

Table 3 shows varying returns for size-based portfolios, with small returns outperforming large portfolios in 14 of 18 years. In 2008, when the global recession occurred, the returns of both portfolios were equal (neutral). Similarly, all small portfolios have outperformed during the COVID-19 period. The size effect regression results in Table 4 show a significant alpha for the small and large portfolios only for the pre-COVID-19 period. To control the impact of value and growth stocks, the average returns of these two portfolios are deducted from small and large portfolios, respectively. Notably, the controlled portfolios show significant alpha values only for the pre-COVID-19 period. Notably, none of the value-controlled portfolios had significant abnormal returns during the COVID-19 period.

Table 2. Regression Results for Value and Growth Portfolios

	Value			Growth		
Year	Alpha	Beta	R Square	Alpha	Beta	R Square
Pre- COVID-19	-0.004 (0.318)	1.280 (0.000)	0.610	-0.015 (0.000*)	0.865 (0.000)	0.671
During COVID-19	0.002 (0.762)	1.177 (0.000)	0.531	-0.001 (0.800)	0.559 (0.000)	0.399
	Size-Controlled Value			**Size-Controlled Growth**		
Pre- COVID-19	-0.013 (0.006*)	1.074 (0.000)	0.481	-0.006 (0.038*)	0.730 (0.000)	0.524
During COVID-19	-0.024 (0.012*)	1.168 (0.000)	0.513	-0.003 (0.589)	0.544 (0.000)	0.372

Notes: Table 2 shows the regression model results for portfolios based on the P/B ratio. The p-values are within parentheses. Indicates statistical significance at the 5% level.

Source: *Computed by authors*

Twenty-one years is a long time to study market efficiency, and the results confirm the anomaly of the size effect in the Indian stock market, even when controlled by the value factor. The pre-COVID-19 period witnessed inefficiencies in the market, while the COVID-19 period witnessed corrections.

Table 3. Returns for Small and Large Size Portfolios

Year	Small Size	Large Size	t-statistics	Outperformer
2002	-0.006	-0.018	(2.120*)	Small Size
2003	0.062	0.055	(2.160*)	Small Size
2004	0.066	-0.008	(2.086*)	Small Size
2005	0.034	0.027	(2.093*)	Small Size
2006	-0.025	-0.019	(2.101*)	Large Size
2007	1.287	1.012	(2.228*)	Small Size
2008	-0.081	-0.081	(2.086*)	Neutral
2009	0.074	0.017	(2.110*)	Small Size
2010	-0.003	-0.024	(2.093*)	Small Size
2011	-0.029	-0.034	(2.093*)	Small Size
2012	-0.017	-0.006	(2.086*)	Large Size
2013	0.017	-0.004	(2.101*)	Small Size
2014	0.047	-0.007	(2.093*)	Small Size
2015	-0.008	-0.022	(2.120*)	Small Size
2016	0.014	-0.002	(2.131*)	Small Size
2017	-0.007	-0.013	(2.101*)	Small Size
2018	-0.036	-0.007	(2.120*)	Large Size
2019	-0.038	-0.014	(2.201*)	Large Size
2020	0.026	0.012	(2.086*)	Small Size
2021	0.048	0.004	(2.200*)	Small Size
2022	0.017	-0.010	(2.160*)	Small Size
2023	0.040	0.010	(2.160*)	Small Size

*Notes: Table 3 shows the results of Welch's test for small and large (market capitalization) quartile portfolios. The t-statistics are within parentheses. *Indicates statistical significance at the 5% level.*

***Source**: Computed by authors*

Furthermore, the market efficiency of Indian stock markets is examined using the ESM. Table 5 presents the cumulative average abnormal returns (CAARs) using the standard market model with a 250-day estimate. The robustness of the results is further checked using an estimation period of 150 days (see Fig. 1 and Fig. 2). The results show that the CAAR is negative and significant for all combined events in different windows. It is also negative and significant for all windows when adverse events occur individually and in combination (Panel A of Table 5). All events' event window (-5 ...5) showed a strongly negative CAAR. This implies that the negative sentiment in the Indian stock markets is so ubiquitous that it outweighs the positive news. The 30-day (5...35) post-event window showed the lowest CAARs for their respective groups (all and negative), suggesting that the pandemic had a long-term impact on Indian stock markets. The CAAR for both adverse events are significantly negative; however, the second adverse event (COVID-19 as a pandemic) had a more adverse effect on all event windows than the first negative event. The event window (-5 + 5) is the most brutal hit, and a CAAR of -0.279 represents a 27% financial loss for investors. The declaration of COVID-19 as a pandemic cost the Indian economy an economic loss of 45,099 million Indian rupees are required, and vigorous government efforts are required to bring the economy back on track.

Panel B of Table 5 presents the results for positive events. The CAAR is significantly positive in all event windows for positive events individually and collectively, except for the event window of (-5 + 5) for the first positive event. The effects of both events are identical to those of the CAARs, which are nearly the same for both events. The event window (-3 + 3) had a higher CAAR than the other windows

Table 4. Regression Results of Small and Large Size Portfolios

	Small Size			Large Size		
Year	Constant	Beta	R square	Constant	Beta	R square
Pre-Covid	0.073 (0.003*)	1.189 (0.003)	0.042	0.043 (0.008*)	1.072 (0.000)	0.075
During Covid	0.018. (0.243)	1.228 (0.000)	0.869	-0.005 (0.321)	0.806 (0.000)	0.610
	Value Controlled Small Size			Growth Controlled Large Size		
Pre-Covid	0.071 (0.004*)	1.042 (0.008)	0.033	0.054 (0.001*)	0.955 (0.000)	0.060
During Covid	0.006 (0.669)	0.260 (0.000)	0.309	-0.007 (0.177)	0.788 (0.000)	0.604

Notes: Table 4 shows the regression model results for portfolios based on firm size (market capitalization). The p-values are within parentheses. ∗ Indicates statistical significance at the 5% level.

***Source**: Computed by authors*

for both events. This suggests that investors are overly optimistic about the news. Indian investors are guided by emotional biases that contradict the assumption that they are rational. Although the first stimulus package (Atmanirbhar Bharat 1.0) generated a return of around 399 Billion, the first stimulus package appears to have a long-term effect, while the second positive event (COVID-19 vaccine) lost its lasting impact, as shown by the results of the post-event window results of (5…35) days. This could be due to a steadily rising number of COVID-19 cases in India. The differential profit percentage for the event window (-3 to +3) between the 1st positive and second adverse events is only 1%, indicating a negligible impact of the 1st stimulus package.

Fama and French (2015) extended their existing three-factor model (Fama & French, 1992) to include investments as an additional factor. Investors can construct portfolios using a combination of these factors. Examining return patterns based on these three factors would benefit portfolio managers to profit from this unusual year when the end of the pandemic is uncertain. In Table 6, the CAARs for all portfolios (except growth) are negative and significant for the first adverse event, indicating the portfolios' vulnerability. Significant negative CAARs are also observed for all portfolios for the second adverse event (the declaration of COVID-19 as a pandemic). Conversely, the announcements of both positive events fueled investor optimism and reflected a significantly positive CAAR for most portfolios. In both positive events, conservative portfolios outperformed aggressively sorted portfolios. This implies investors' confidence to reinvest their profits. The CAAR for both the large and small portfolios is significantly negative for the first positive event and significantly positive for the second positive event (-5 to +5). The COVID-19 vaccination package has impacted the extensive portfolio more than the small portfolio. Interestingly, value portfolios have a significantly higher positive CAAR than growth portfolios, suggesting investors believe in solid fundamentals. Growth portfolios have a significantly negative CAAR, suggesting they capitalise on fewer growth opportunities. Overall, conservative/value portfolios have fared better than aggressive/growth portfolios in the unusual COVID-19 portfolio.

Table 5. Cumulative Average Abnormal Returns: Various Announcements

	Estimation Period: 250 days					**Estimation Period: 150 days**				
Window	(-5...5)	(-4...4)	(-3...3)	(-2...2)	(5…35)	(-5...5)	(-4...4)	(-3...3)	(-2...2)	(5…20)
All Events	-0.068 (0.001*)	-0.058 (0.000*)	-0.054 (0.000*)	-0.040 (0.000*)	-0.088 (0.001*)	-0.066 (0.000*)	-0.058 (0.003*)	-0.044 (0.000*)	-0.029 (0.000*)	-0.031 (0.000*)
Panel A: Negative Events										
Negative Events	-0.145 (0.000*)	-0.134 (0.000*)	-0.128 (0.000*)	-0.099 (0.000*)	-0.173 (0.000*)	-0.137 (0.000*)	-0.125 (0.000*)	-0.113 (0.000*)	-0.086 (0.000*)	-0.134 (0.004*)
1st Negative Event	-0.012 (-0.054*)	-0.026 (0.000*)	-0.048 (0.000*)	-0.045 (0.000*)	-0.370 (0.000*)	-0.017 (0.005*)	-0.031 (0.000*)	-0.051 (0.000*)	-0.044 (0.000*)	-0.035 (0.005*)
2nd Negative Event	-0.279 (0.000*)	-0.241 (0.000*)	-0.207 (0.000*)	-0.153 (0.000*)	0.023 (0.000*)	-0.257 (0.000*)	-0.219 (0.000*)	-0.176 (0.000*)	-0.128 (0.000*)	-0.233 (0.003*)
Panel B: Positive Events										
Positive Events	0.010 (0.001*)	0.017 (0.002*)	0.021 (0.000*)	0.018 (0.000*)	-0.002 (0.000*)	0.004 (0.001*)	0.009 (0.003*)	0.024 (0.000*)	0.028 (0.000*)	0.072 (0.000*)
1st Positive Event	0.007 (0.188)	0.016 (0.001*)	0.022 (0.000*)	0.018 (0.000*)	0.093 (0.000*)	0.017 (0.001*)	0.019 (0.000*)	0.036 (0.000*)	0.039 (0.000*)	0.186 (0.000*)
2nd Positive Event	0.013 (0.029*)	0.018 (0.000*)	0.019 (0.000*)	0.019 (0.000*)	-0.097 (0.000*)	-0.009 (0.126)	-0.001 (0.780)	0.013 (0.003*)	0.017 (0.000*)	-0.042 (0.000*)

*Notes: Table 5 presents the CAAR (p-values within parentheses) for different estimation periods and event windows. The standard market model calculates the daily abnormal returns. The event dates and windows are shown in Fig.1 and Fig. 2, respectively. The statistical significance of the CAAR is tested using a cross-sectional t-test. *It indicates statistical significance at the 5% level.*

***Source**: Computed by authors*

Table 6. CAAR for Financial Characteristics Sorted Portfolios

Window	Estimation Period: 250 days				Estimation Period: 150 days			
	(-5...5)	(-4...4)	(-3...3)	(-2...2)	(-5...5)	(-4...4)	(-3...3)	(-2...2)
Panel A: Negative Events								
1st Negative Event								
Conservative	-0.019	-0.042	-0.062	-0.047	-0.014	-0.037	-0.059	-0.045
	(0.186)	(0.001*)	(0.000*)	(0.000*)	(0.329)	(0.002*)	(0.000*)	(0.000*)
Aggressive	-0.041	-0.040	-0.020	-0.020	-0.020	-0.020	-0.039	-0.041
	(-0.323)	(-0.254)	(-0.110)	(-0.096)	(0.132)	(0.021*)	(0.000*)	(0.000*)
Large Size	-0.047	-0.052	-0.059	-0.041	-0.038	-0.043	-0.050	-0.034
	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.001*)	(0.000*)	(0.000*)	(0.000*)
Small Size	0.004	0.008	-0.008	-0.018	0.000	0.001	-0.017	-0.024
	(0.778)	(0.379)	(0.399)	(0.014*)	(0.977)	(0.911)	(0.076)	(0.002*)
Value	-0.024	-0.029	-0.025	-0.011	-0.033	-0.037	-0.035	-0.019
	(0.082)	(0.014*)	(0.017*)	(0.203)	(0.015*)	(0.001*)	(0.001*)	(0.026*)
Growth	0.008	0.015	0.012	-0.003	0.009	0.015	0.012	-0.003
	(0.554)	(0.074)	(0.113)	(0.657)	(0.538)	(0.077)	(0.129)	(0.663)
2nd Negative Event								
Conservative	-0.293	-0.258	-0.218	-0.163	-0.289	-0.258	-0.209	-0.173
	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)
Aggressive	-0.221	-0.187	-0.159	-0.111	-0.202	-0.172	-0.149	-0.103
	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)
Large Size	-0.234	-0.215	-0.185	-0.152	-0.223	-0.205	-0.178	-0.148
	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)
Small Size	-0.231	-0.183	-0.158	-0.121	-0.242	-0.194	-0.168	-0.130
	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)	(0.000*)
Value	-0.021	-0.034	-0.019	-0.053	-0.016	-0.029	-0.015	-0.051
	(0.429)	(0.162)	(0.259)	(0.000*)	(0.584)	(0.249)	(0.398)	(0.000*)
Growth	-0.023	-0.016	-0.022	-0.035	-0.017	-0.011	-0.017	-0.032
	(0.164)	(0.254)	(0.079)	(0.001*)	(0.306)	(0.430)	(0.155)	(0.001*)

Panel B: Positive Events

1st Positive Event								
Conservative	-0.028	-0.014	0.015	0.020	0.002	0.008	0.030	0.031
	(0.006*)	(0.092)	(0.076)	(0.010*)	(0.884)	(0.364)	(0.001*)	(0.000*)
Aggressive	-0.023	-0.004	0.023	0.033	0.024	0.060	0.066	0.088
	(0.024*)	(0.633)	(0.000*)	(0.000*)	(0.012*)	(0.000*)	(0.000*)	(0.000*)
Large Size	-0.036	-0.026	0.004	0.012	-0.013	-0.005	0.017	0.023
	(0.000*)	(0.006*)	(0.604)	(0.096)	(0.185)	(0.574)	(0.029*)	(0.001*)
Small Size	-0.024	-0.019	0.004	0.006	-0.003	-0.007	0.011	0.012
	(0.003*)	(0.002*)	(0.563)	(0.312)	(0.743)	(0.265)	(0.100)	(0.052)
Value	0.015	0.026	0.031	0.021	0.011	0.020	0.032	0.023
	(0.206)	(0.012*)	(0.001*)	(0.014*)	(0.343)	(0.036*)	(0.001*)	(0.007*)

Notes: Table 6 presents the CAAR (p-value within parentheses) for different estimation periods and event windows for portfolios sorted by financial characteristics. Conservative and aggressive (investment), smallest and largest (total assets), and value and growth (P/B ratio) are measures of financial characteristics. Each portfolio consists of 70 stocks, representing each measure's first and last quartiles. The standard market model is used to calculate the daily abnormal returns. The event dates and windows are shown in Fig.1 and Fig. 2, respectively. The statistical significance of the CAAR is tested using a cross-sectional t-test. ∗ Indicates statistical significance at the 5% level.

***Source**: Computed by authors*

Table 7. Drivers of Realized CAR

	All Events	**Negative Events**	**1st Negative Event**	**2nd Negative Event**	**Positive Events**	**1st Positive Event**	**2nd Positive Event**
Constant	-0.058	-0.133	-0.010	-0.257	0.017	0.002	0.032
	(0.000*)	(0.000*)	(0.367)	(0.000*)	(0.012*)	(0.782)	(0.002*)
Liquidity	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.394)	(0.975)	(0.927)	(0.923)	(0.146)	(0.051*)	(0.785)
Value	0.000	0.000	0.000	0.000	0.000	-0.002	0.001
	(0.719)	(0.932)	(0.883)	(0.844)	(0.475)	(0.035*)	(0.392)
Leverage	-0.039	-0.063	-0.014	-0.112	-0.015	0.049	-0.080
	(0.015*)	(0.020*)	(0.643)	(0.016*)	(0.427)	(0.048*)	(0.006*)
Profitability	0.000	0.000	0.000	0.000	0.000	0.000	-0.001
	(0.495)	(0.941)	(0.623)	(0.679)	(0.305)	(0.529)	(0.051*)
R square	0.025	0.024	0.003	0.023	0.013	0.044	0.033

Notes: Table 7 presents the estimation results from the regression model, as stated.

$CAR_{i,[\tau1;\tau1]} = \gamma0 + \gamma1Liquidity + \gamma2Value + \gamma3Leverage + \gamma4ProfitabilityROFITABILITY + \varepsilon i$ CAR for the (-5...+5) event window represents the dependent variable. The independent variables are liquidity as cash and cash equivalents at the end of the year, value as price-to-book ratio, leverage as total debt as a percentage of total assets, and profitability as net income as a percentage of total assets. Data about the independent variables are collected from the Prowess CMIE database for the last completed financial year. The coefficient with its p-value within parentheses shows statistical significance. ∗ Indicates statistical significance at the 5% level.

***Source**: Computed by authors*

The results in Table 7 show the drivers of the cross-sectional CAR for the event window (-5 to +5). Leverage is found to be the only factor that negatively affects all combined and adverse events. Investors appear to be concerned about a company's leverage during the pandemic. A similar result is shown for the second adverse event, indicating that only leverage explains the CAR. In response to the first stimulus package, liquidity and leverage are significant positive determinants. At the same time, value is a significant negative driver of the cross-sectional CAR debt, and profitability acts as key negative drivers of CAR in response to the second positive event. Elnahas et al. (2018) documented that companies in disaster-prone areas strive to reduce their debt. Therefore, all variables examined are major drivers of stock returns, and investors have considered them into account when constructing their portfolios during the pandemic. The most important of these variables is leverage, which affects the returns of all (combined/single) events.

3.1 Robustness and extensions

The results of the robustness test are listed in the appendix in tables A.1 and A.2. Various alternative parametric tests (t-test time series, Patell test, and Böhmer test) and non-parametric tests (Corrado rank and sign test) are used for an estimation period of 250 days and 150 days. For the alternative tests, the results remain the same. The extension results in Tables A.3 and A. 4 show CAR's regressive drivers for each positive and adverse event. Leverage is the essential key factor in realizing CAR.

4. Conclusion

This study examines the efficiency of Indian stock markets by examining the presence of size and value anomalies before and during COVID-19. Efficiency is rechecked by conducting an event study of positive and negative COVID-19 announcements. This study also assesses the impact of announcements on the returns of various portfolios. Finally, this study examines the major factors influencing the market returns of various events. This novel work not only adds to the stock market literature but also presents the tests of the efficiency of the Indian market by adding the dynamics of stock market anomalies before and during the COVID-19 period and the key economic events that occurred post-Covid-19 by covering a considerable sample period of 21 years.

The small portfolio outperforms itself in controlling the value/growth factor, and it was not value-controlled in the 18-year period leading up to the pandemic. This confirms the existence of a size premium, which indicates inefficiencies when prices of small-cap stocks do not fully reflect all available information and hence can be exploited as a trading strategy by Indian investors. However, its disappearance in the last three years (during COVID-19) shows corrections in the market due to improved information dissemination, technological advances, data availability, and financial research. It also challenges the traditional Capital Asset Pricing Model (CAPM), leading to further investigation into asset pricing models.

However, value investing is on the wane and hurts returns after size control. Investors are advised not to fall into the value trap as value stocks may remain undervalued for reasons such as poor business fundamentals, declining industries or sector dynamics. From now on, investors must rethink their value investing strategies to reflect changes in market structure, sector rotation and investor preferences. This could include integrating new metrics that focus on, for example, intangible assets, environmental, social and governance (ESG) factors or innovation potential. The size-controlled negative performance of value stocks suggests that size alone may have explained much of the excess returns previously attributed to value investing. This would imply that the size premium drives returns, not necessarily the value premium.

Apart from economic stimulus and COVID-19 vaccination packages, other economic events in the Indian market, such as Pradhan Mantri Gareeb Kalyan Yojna and liquidity injections by the Reserve Bank of India by maintaining the interest rate to support economic recovery have also resulted in a change in market behaviour. The post-COVID 19 market behaviour in India has been characterized by increased retail participation, a shift towards technology and digital sectors, changes in sectoral performance, and a growing focus on ESG and responsible investing. While the initial market crash created uncertainty, the V-shaped recovery and record highs in Indian indices reflect a new era of investor sentiment driven by liquidity, digital transformation, and government support. The proclamation of the pandemic triggered a market slump that caused Indian stock markets to suffer economic losses of 27%. The results of this study will be helpful for investors, policymakers, and government. The pandemic-induced market decline proves that conservative and value portfolios respond best in response to the stimulus packages and COVID-19 vaccine packages. The effects of this can be observed in the return

flows of the post-event window of days (5...35). The pandemic-induced decline in the market proves that conservative and value-driven portfolios perform best in response to the economic stimulus and COVID-19 vaccination packages. Leverage is confirmed to be the driver of cumulative abnormal returns, a crucial factor for investors and fund managers to consider. Based on the above, it can be concluded that market inefficiencies in the Indian stock market require further market reforms. In order to reduce information asymmetry in the Indian market, it is necessary to mandate corporate disclosures such as frequent and detailed reporting in the (ESG) reports. Corporate governance reforms need to be reinforced, particularly improving the independence of boards and strengthening the mechanisms for whistle-blowers within companies or among market participants. Leverage, liquidity, value, and profitability are confirmed as drivers of CARs, which are crucial factors to be considered by investors and fund managers. The study is limited to the Indian context, but similar studies can be carried out for the rest of the developing countries. The impact of various announcements on sector returns and global COVID-19-related announcements on emerging markets can be examined. Future studies should also be conducted to examine the impact of investor sentiment on returns during the COVID-19 period or any other crisis.

Notes:

[1] https://www.who.int/director general/speeches/detail/who- director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

[2] https://www.worldometers.info/coronavirus/countries-where-coronavirus-has-spread/. Accessed on November 14 2021.

[3] https://www.worldometers.info/coronavirus/countries-where-coronavirus-has-spread/. Accessed on November 14 2021.

[4] https://www.worldometers.info/coronavirus/countries-where-coronavirus-has-spread/. Accessed on November 14 2021.

[5] https://affairscloud.com/india-at-8th-position-in-market-cap-among-worlds-top-10-nations-bloomberg/.

[6] The initial sample consists of 500 companies in the BSE 500 index, but only 280 companies are included in the final sample. Companies with incomplete data for any period are excluded from the study.

[7] The average market capitalization of our sample firms is INR 161645 million. The economic loss is (-0.279*16145) for the event window and (-5...+5) for the second negative event.

[8] The average market capitalization of our sample firms is INR 161645 million. The profit is (0.022*16145) for the event window (-3...+3) for the first positive event.

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Digitalization and Customer Value – A Thematic Literature Review and Research Propositions

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Abstract

The purpose of this paper is to undertake a systematic review of the literature on customer value in the digitalization context and offer an integrative framework. Suitable keywords were used to select pertinent peer-reviewed journal articles published in reputed journals in business, marketing and management from 2006 to 2022. The articles were categorized across four themes, and a graphical representation of these was shown based on year of publication, theme-wise distribution across years and the highly cited articles under each theme. The PRISMA 2020 approach was adopted to identify the four themes: customer goal fulfilment through customised solutions; value co-creation through personalised customer experiences; value co-creation through brand communities; and relationship benefits and loyalty rewards. This paper contributes to the body of literature by offering an integrative framework and a set of research propositions based on the customer value themes in the context of digitalization.

Keywords: *Customer value; digitalization; thematic review; value co-creation; brand community; loyalty*

1. Introduction

Customer value has been conceptualized in literature as a trade-off between benefits and costs. However, such a unidimensional approach is not appropriate in the context of digitalization (Chuah et al., 2017; Khalifa, 2004; Vargo et al., 2017). Digitalization has resulted in the exchange of goods and services for monetary value through internet-based digital platforms wherein value creation includes social aspects, relationships and experiences of customers (Rangaswamy et al., 2020). Customers control customer value in the context of digitalization, and a holistic perspective is required with a focus on the functional and economic benefits as well as the experiential and social benefits (Gronroos & Voima, 2013).

Customers are no longer passive recipients of value and have become proactive co-creators of value (McColl-Kennedy et al., 2017). Digitalization has enabled value co-creation through the integration of complementary expertise, skills and knowledge of customers along with other partners in the network (Delpechitre et al., 2018). However, it has been pointed out that merely integrating resources may not be enough to ensure value creation owing to the multi-dimensional nature of customer value as a result of digitalization (Vargo et al., 2017). Digitalization has resulted in customers being connected, informed and empowered, resulting in their active participation, and firms need to adapt to the new norm for the creation of customer value (Prahalad & Ramaswamy, 2004; Verhoef et al., 2021).

Digitalization has facilitated firms and customers to share information, time and attention through an interactive process, and firms need to help customers co-create value to fulfil their individual goals (Delpechitre et al., 2018; Gronroos & Voima, 2013; Rangaswamy et al., 2020). Value is therefore uniquely constructed in the individual customer's life (Vargo & Lusch, 2008), influenced by his or her functional, emotional, social, and relational experiences during the period of the relationship between the firm and the customer (Yu & Sangiorgi, 2018). Customers can now build their identities, express themselves, socialize with others and create value for themselves and others (Carvalho & Fernandes, 2018). Therefore, in the context of digitalization, customer value is denoted by the value that is co-created by customers and others in their network. More importantly, customer-to-customer exchanges on digitalized platforms are influencing customer value (Gruen et al., 2006; Ramaswamy & Ozcan, 2016; Ramaswamy & Ozcan, 2018). Therefore, non-transactional customer behaviours (e.g., customer-to-customer exchanges on digital platforms) impact value creation for other customers (Cambra-Fierro et al., 2018). The primary role played by customers in the process of creating value has amplified the need to understand the individual and collective aspects of value (Heinonen et al., 2019).

Studies on customer value in the context of digitalization have shown that functional value, emotional value, and social value are influencing customer behaviour (Carlson et al., 2019; Choi et al., 2019; Gan & Wang, 2017; Overby & Lee, 2006). On the other hand, it has been pointed out that the individual customer's role in value creation is changing from passive to proactive participation and customer value is determined by the customer's context and needs (Pinho et al., 2014). Furthermore, the contextual nature of customer value implies that it can change for the same customer over time (Smith & Colgate, 2007). Therefore, about customer value in the context of digitalization, the distinctions between functional, emotional and social value are getting blurred (Yrjola et al., 2018). Although digitalization has become the norm in many businesses, studies have focused on specific aspects, and a holistic approach is required since digitalization is changing customer behaviour (Verhoef et al., 2021). Therefore, the objective of this study is to undertake a thematic analysis concerning customer value in the context of digitalization and propose an integrative framework. To the best of our knowledge, there is no systematic literature review in this context to analyze customer value creation. The paper has several contributions to the literature. First, it has conducted a review of papers from 2006 to 2022 and undertaken a thematic analysis (Paul & Criado, 2020). Second, the framework has identified four themes that can be used to understand customer value creation literature in a digitalized context. Third, a research agenda has been proposed to guide other researchers on the gaps in research related to customer value in the context of digitalization.

The paper is presented in the following way. It starts with an introduction. The subsequent section attempts to provide a conceptual background of customer value in the context of digitalization. The third section presents methodology for the review. Subsequently, the paper analyses and presents the findings, both general findings in terms of graphs and tables and theme-wise description. Based on the themes, it presents an integrated framework and attempts to propose future research propositions in the subsequent section. The paper ends with concluding remarks, including limitations of the study.

2. Customer value and digitalization: Conceptual background

Customer value has been referred to as an elusive concept in marketing (Gronroos & Voima, 2013), and studies have typically conceptualized it as a trade-off between benefits and costs. Early studies on customer value defined it as: "what buyers are willing to pay" (Porter, 1985; p. 3) and "value is the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given" (Zeithaml, 1988; p. 14). Therefore, firms engage in creating customer value by exceeding customers' expectations in product quality, service quality and through value-based prices (Naumann, 1995).

The digitalisation of business models as a result of the ubiquity of the internet has resulted in informed, connected, empowered, and active customers scrutinising and analysing the value creation processes of firms (Prahalad & Ramaswamy, 2004). Firms have realized that customers can no longer be regarded as merely passive recipients of value but as co-creators and ultimate determiners of value (McColl-Kennedy et al., 2015). While firms have traditionally regarded customers as operant resources, digitalization resulted in reversing the situation, wherein customers began to regard firms as one of the various resources to achieve their goals (Hibbert et al., 2012). Consequently, firms have now accepted that customers also have value networks (e.g., social ties, consumption communities, media, and other firms) and can undertake a resource integration role (Hibbert et al., 2012; Lusch & Vargo, 2006).

While value co-creation is becoming the norm, it has been pointed out that merely shifting the focus from the firm to the customer is not enough (Vargo et al., 2017). Traditionally, firms have created value for customers through products and services (referred to as value-in-exchange). However, when customers' efforts are involved in the process of value creation, it cannot be termed as value-in-exchange (Gronroos & Voima, 2013). Furthermore, though co-created value has been referred to as value-in-use but even this cannot be representing customer value in the age of digitalization since "the common cognitive perspective has shifted to a more holistic and experiential perspective that recognizes value in the context of customer experiences" (Gronroos & Voima, 2013; p. 134). Therefore, in the context of digitalization, customer value is co-created by several partners (including the firm) but controlled by empowered customers.

Customer value has been simplistically explained based on benefits received and the costs incurred, but such an unidimensional approach is not suitable for a dynamic concept like customer value, especially in the context of digitalization (Chuah et al., 2017; Khalifa, 2004; Vargo et al., 2017). Customer value from a multi-dimensional perspective needs to focus on the utilitarian as well as the experiential aspects (Sanchez-Fernandez & Iniesta-Bonilla, 2007). Firms have focused on creating superior customer value by highlighting the functional and emotional benefits (De Chernatony et al., 2000). Studies have shown that social value and emotional value are also the dimensions of customer value (Sweeney & Soutar, 2001). In the context of digitalization, researchers have established that utilitarian and hedonic value drive customer choices (Gan & Wang, 2017; Kim & Hwang, 2012; Overby & Lee, 2006). When customers participate in value co-creation through digitalization, it leads to functional and emotional value and results in customer satisfaction (Carlson et al., 2019; Chan et al., 2010). Furthermore, customers are willing to recommend the firm through digital platforms (e.g. social media) when they derive functional and emotional value (Choi et al., 2019).

When customers can access desired products at an affordable cost, it leads to functional value. In contrast, emotional value is concerned with the psychic benefits, including enhanced mood, pleasure, and enjoyment (Rintamaki & Kirves, 2017). Digitalization has led to greater connectedness among customers through social media, and firms are creating social value, leading to greater satisfaction and loyalty (Yoo & Park, 2016). On the other hand, it has been pointed out that the individual customer's role in value creation is changing from passive to proactive participation and customer value is determined by the customer's context and needs (Pinho et al., 2014). Furthermore, the dynamic nature of customer value implies that it can change for the same customer over time (Smith & Colgate, 2007). Therefore, about customer value in the context of digitalization, the distinctions between functional, emotional and social value are getting blurred (Yrjola et al., 2018).

Digitalization has resulted in highly empowered customers, whereby value creation is being controlled by customers (Gronroos & Voima, 2013; Mathwick, 2002). Furthermore, digitalization has resulted in value creation through networks and therefore, customer value has to be seen in a social context since customers are trying to achieve a positive sense of self while creating and enhancing

relationships on digitalized platforms (e.g. social media) (Pempek et al., 2009; Rangaswamy et al., 2020). Customers are now active co-creators and can build their identities, express themselves, socialize with others and create value for themselves and others (Carvalho & Fernandes, 2018). More importantly, customer-to-customer exchanges on digitalized platforms are influencing customer value (Gruen et al., 2006; Lemon & Verhoef, 2016; Ramaswamy & Ozcan, 2016). In digitalised business models, non-transactional customer behaviours (e.g., customer-to-customer exchanges on digitalised platforms) can impact the value perceptions of other customers (Cambra-Fierro et al., 2018). The primary role played by customers in the process of creation of value has amplified the need to understand the individual and collective aspects of value (Heinonen et al., 2019).

Digitalization has enabled firms and customers to share information, time and attention through an interactive process, and firms need to help customers co-create value to fulfil their individual goals (Delpechitre et al., 2018; Gronroos & Voima, 2013; Rangaswamy et al., 2020). Therefore, it has been suggested that "instead of focusing on how customers can be engaged in co-creating with the firm, service providers should rather focus on becoming involved in the customers' lives" (Gronroos & Voima, 2013; p. 134). Recent studies have pointed out the growing impact of digitalization on customer value (Leroi-Werelds, 2019). Although digitalisation has become the norm in many businesses, studies have focused on specific aspects, and a holistic approach is required, as digitalisation is becoming the new norm and is changing customer behaviour (Verhoef et al., 2021). Therefore, the objective of this study is to adopt an integrative approach and interpret the various dimensions of customer value in the context of digitalization.

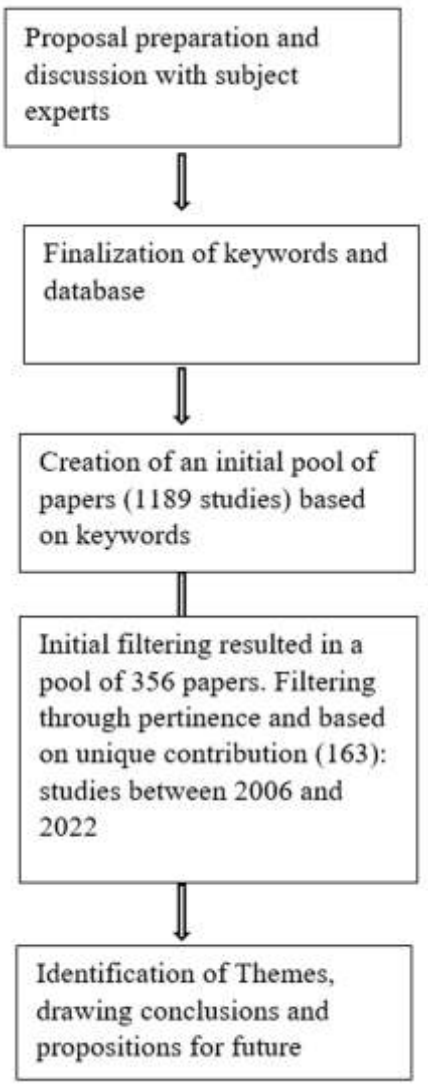
3. Methodology

Customer value has evolved from goods-grounded logic to service-grounded orientation over the past few decades. Subsequently, digitalization has enabled value co-creation and value absorption from social e-communities. This has changed the process of value creation from a passive recipient approach to an active co-creator approach. Hence, the objective of this study is to propose a framework for understanding customer value in the context of digitalization through a review of the literature.

The process followed for the review is presented in Figure 1. A detailed proposal was prepared for the literature review and was discussed with three industry practitioners and two academic subject matter experts. Suggestions from the panel members helped identify keywords and themes for the analysis.

Thematic reviews with a framework provide a robust structure for literature review and are proven to be more acceptable (Paul & Criado, 2020). This paper identified four critical themes and proposed a framework for customer value in the context of digitalization. For the review process, we referred to the 'Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) 2020' statement (Page et al., 2021). The detailed steps are narrated in Table 1. The keywords such as 'customer value', 'value creation', 'value co-creation'. 'digitalization', 'online communities', 'customer relationship', 'customer experience' were first searched on databases like Scopus, EBSCO Business Source Complete, ProQuest, ScienceDirect, Google Scholar, JSTOR etc. resulting in an initial pool of 1189 studies. Each peer-reviewed journal article was considered as a unit of analysis. The searches focused on papers published between 2006 and 2022, while a few seminal papers published prior to 2006 were also included. The abstracts of the papers were read, and a filtering process was used to ensure fit with the objective of the current study, and the number of papers for further processing was reduced to 356. The pertinence of each paper was assessed based on comparison with the already selected papers by ascertaining contributions that either added to or differed from the theoretical elements that had already been identified. The unique contribution of each paper was analysed based on new findings relating to customer value in the context of digitalisation. The findings of each paper were compared with those of other papers. After eliminating papers that were found irrelevant or had similar findings to the ones already chosen, the final list of 163 papers was taken up for detailed review. The findings of all these 163 papers were studied carefully to identify the overarching dimensions or themes that cover customer value creation in a digital environment.

The four themes that emerged very strongly as an outcome of the literature review are as follows: customer goal fulfilment through customized solutions; value co-creation through personalized customer experiences; value co-creation through brand communities; and relationship benefits and loyalty rewards. These themes were discussed with three industry experts to get their concurrence and suggestions. In the following sections, each of these themes has been discussed in detail.



Source: Prepared by authors

Figure 1. The process

4. Findings and Discussions

The findings mentioned in this paper are presented in two parts. The first part provides a general classification to describe the articles for the year of publication, identified themes and highly cited papers. The second part elaborates on the four identified themes and offers a framework. Further, towards the end of the paper, a research agenda has been proposed based on the themes identified in this study. The findings are explained in the following sections.

4.1 General results of the systematic literature review:

This subsection labels the classification of literature based on publication year, the identified themes and mentions the most cited papers. The descriptions (Figure 2) indicate the number of papers analyzed for this study from 2006 to 2022. The number of research articles published has seen a considerable increase in the period from 2014 to 2022 compared to 2006 to 2013. The topic has gained traction in the latter half of the last decade, driven by the growth of e-commerce and social media platforms. Figure 3 shows the distribution of papers across the identified themes and years. The themes 'customer goal fulfilment through customized solutions' and 'value co-creation through personalized customer experiences' contribute 29% and 27% respectively to the review. The themes 'value co-creation through brand communities' and 'relationship benefits and loyalty rewards' contribute to 24% and 20% respectively. Research on the themes 'value co-creation through brand communities' and 'relationship benefits and loyalty rewards' was considerably less from 2006-2016 compared to the duration 2017-2022. These two concepts are relatively newer compared to the other two themes. Based on the citation analysis, Table 2 shows the top publications based on the total number of citations since publication.

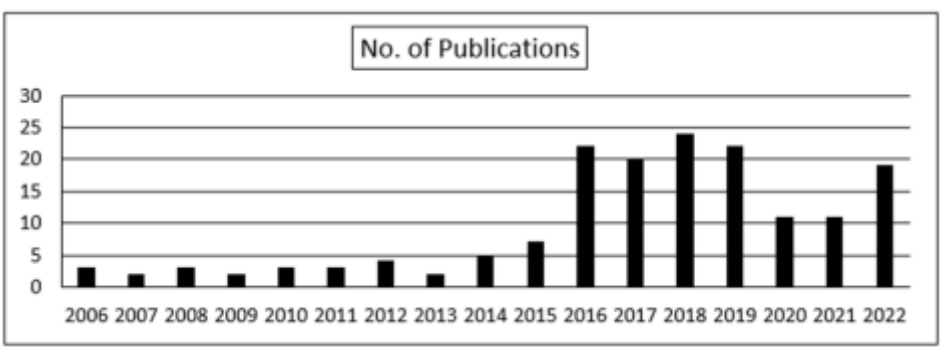


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Figure 2. Distribution of the papers by year of publication

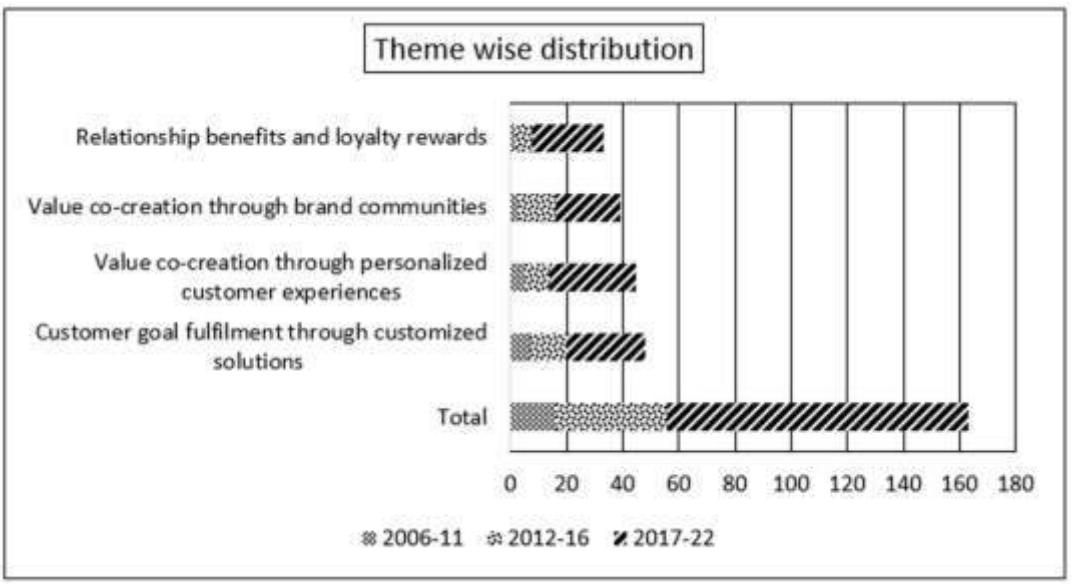

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Figure 3. Distribution of the papers: Themes and year

Table 1. PRISMA 2020 statement aspects followed in the review process:

Review Methodology (PRISMA 2020)	Description of Checklist items
Eligibility Criteria	Inclusion Criteria: Publications from 2006 to 2022 that addressed customer value creation through technology interventions Exclusion Criteria: Excluded after studying the abstracts based on repetition of findings, papers that dealt with cloud computing, technology adoption, instead of value creation
Information Sources	Scopus, EBSCO Business Source Complete, Proquest, Sciencedirect, Google Scholar, JSTOR
Search Strategy	Key words identified through discussion with three industry practitioners and two academic subject matter experts
Selection process	The identified papers were read for pertinence and contribution, and the final 163 papers were included for theme identification.
Synthesis	The 163 eligible papers were studied to identify the underlying themes. The four themes that emerged very strongly as an outcome of the literature review are as follows: customer goal fulfilment through customized solutions; value co-creation through personalized customer experiences; value co-creation through brand communities; and relationship benefits and loyalty rewards
Certainty assessment	The identified themes were discussed with three industry experts to get their concurrence.
Results	The identified themes were discussed for their relevance and to explore the future research agenda.

Source: Compiled by authors

Table 2. Themes, sub-themes, and highly cited papers during the review period

Theme	Author	Journal	Citation
Customer goal fulfilment through customized solutions	Overby et al. (2006)	Journal of Business Research	1255
	Blocker et al. (2011).	Journal of the Academy of Marketing Science	521
Value co-creation through personalized customer experiences	Vargo et al. (2008)	European Management Journal	4095
	Brodie et al. (2011).	Journal of Service Research	3699
	Lemon et al. (2016).	Journal of Marketing	3594
	Chan et al., (2010)	Journal of Marketing	1233
	Patricio et al., (2011)	Journal of Service Research	717
	Flavian et al. (2019).	Journal of Business Research	506
	Bolton et al., (2018)	Journal of Service Management	464
	Bilgihan et al., (2016)	International Journal of Quality and Service Sciences	309
Value co-creation through brand communities	Gruen et al. (2006)	Journal of Business Research	1691
	Baldus et al., (2015)	Journal of Business Research	575
	De Vries and Carlson (2014)	Journal of Brand Management	458
	Hollebeek and Macky (2019)	Journal of Interactive Marketing	386
Relationship benefits and loyalty rewards	Palmatier et al. (2008)	Journal of Marketing	596
	Wang and Kim (2017)	Journal of Interactive Marketing	557
	Nyadzayo and Khajehzadeh (2016)	Journal of Retailing and Consumer Services	429

4.2 Themes identified through literature review:

The review of literature helped in identifying four themes: customer goal fulfilment through customized solutions; value co-creation through personalized customer experiences; value co-creation through brand communities; and relationship benefits and loyalty rewards

4.2.1. Theme 1: Customer goal fulfilment through customized solutions

Recent research shows that customer value is being impacted by digitalization through the use of self-service technologies, big data analytics, artificial intelligence, service robots, internet of things, and virtual as well as augmented reality (Leroi-Werelds, 2019; Salvi et al., 2021). Based on the customer segment, a suitable customer interaction model needs to be designed by incorporating suitable digital technologies that can be used by the customer for creating value (Gleiss et al., 2021; Lahteenmaki et al., 2022). Customers differ in their preferences, resources, and digital access, which can help fulfilment of goals and attaining well-being (Fazal-e-Hasan et al., 2018). Digitalization can help customers create value that will lead to their well-being (Gronroos & Voima, 2013).

Digitalization has enabled information exchange and dialogue between firms and customers through a personalized and immersive environment for co-creation of customer value (Bolton et al., 2018; Delpechitre et al., 2018; Parise et al., 2016; Zhang et al., 2020). Firms are enabling customers' value co-creation through conversations and sophisticated interactions that include the firm's employees, customers, and other partners on a digitalized platform (Gronroos, 2011; Quach & Thaichon, 2017; Verhoef et al., 2021). Firms need to develop appropriate value networks through suitable partners that can provide integrated support to customer activities (Patricio et al., 2011). Value networks or meta-ecosystems are comprised of a diverse set of partners interacting to help the firm and the customers to co-create value (Bidar et al., 2022; Breidbach & Maglio, 2016; Khanagha et al., 2017; Lusch et al., 2010; Palmié et al., 2022; Pinho et al., 2014). Firms collect, accumulate and repurpose digital data streams to create value through information (Pigni et al., 2016; Subramaniam, 2022; Xu et al., 2017). When customers co-create value, they offer inputs that are informational, emotional, financial, physical and relational – these inputs can be interpreted to read, understand and respond to customers' emotions (Ple, 2016; Wirtz et al., 2016).

The appropriate volume (amount of data), velocity (speed of data capture and analysis), variety (types and sources of data), and veracity (data quality, context and accuracy) help firms interpret the value considerations of individual customers (Anuradha, 2015; Kunz et al., 2017; Rahman et al., 2022). Furthermore, context-aware recommendations undertake sentiment assessment and customer preference mining for making personalized recommendations (Jing et al., 2018; Rust, 2020). Predictive analytics helps in making personalized recommendations that take into consideration the customer's intent and goals (Cui & Wu, 2016; Gong, 2018; Parise et al., 2016). Technology is enabling firms to create, communicate, capture and deliver value for customers through context-aware solutions, and customers are appreciating the authentic manner in which the value is created (Cuesta-Valino et al., 2022; Grewal et al., 2020). The inherent risks and privacy concerns of customers need to be considered while designing the systems (Quach et al., 2022).

The dynamic nature of customer value suggests that each customer perceives value based on his/her own needs and context (Fernandes & Remelhe, 2016; Leroi-Werelds, 2019). Digitalization has enabled firms to integrate diverse products and services to solve customer problems through customized solutions using contextual information about customers (Ple, 2016; Reinartz et al., 2019; Ross et al., 2017). Customization enhances the value and price offers for customers, which may involve premium prices since they want to assert their identity by owning a product that reflects their image (Gupta et al., 2019; Merle et al., 2010; Pera et al., 2016). Digitalization helps to capture customer needs, and intelligence capabilities can be leveraged to interpret the changing needs of customers (Lenka et al., 2017). Firms are developing absorptive capacity for new knowledge acquisition, analysis and utilization for value creation (Bozic & Dimovski, 2019).

4.2.2 Theme 2: Value co-creation through personalized customer experiences

Firms can no longer offer customer value through their products but need to focus on the experiences of customers (Akesson et al., 2014; Ali et al., 2021). Digital technologies offer user interfaces that facilitate easy navigation, accurate information and positively influence customer value through real-time information, automation of tasks, etc. (Reinartz et al., 2019; Sarkar et al., 2020).

Digitalization has resulted in customer firm interactions through online social media, websites, mobile apps and other touchpoints that aim at creating a unified and seamless experience for customers (Bilgihan et al., 2016; Kuehnl et al., 2019; Lahteenmaki et al., 2021). Customers are using digitalization for information search, website navigation, ordering processes, customer service interactions, delivery, and firms need to follow the digital journeys of customers (Bag et al., 2021; Blut, 2016; Leeflang et al., 2014). The characteristics of digital access have resulted in experiences that can be broadly categorized as subjective (touchpoint experiences and decision making) and contextual (service and networks for value co-creation) (Homburg & Wielgos, 2022; Lipkin, 2016; Kraus et al., 2021; Towers & Towers, 2022).

Customers are freely moving across online channels, mobile devices and physical stores, sometimes during a single transaction process. They are using showrooming (seeing products at physical stores and buying online) and webrooming (seeing products online and buying at physical stores) (Hu & Tracogna, 2020). Firms are actively engaging customers in service design to understand how customers create value in their context (Trischler et al., 2018). Customers undertaking co-creation through digitalization enjoy higher levels of cognitive, affective and social experiences (Verleye, 2015). Cognitive experiences are

concerned with outcomes of interactions, thinking and intellectual experience, security, involvement, efficiency and the product experience (Alnawas & Hemsley-Brown, 2018). Affective experiences can be emotionally engaging with themes, metaphors, and stories that are concerned with fun, escapism, participation and immersion (Alnawas & Hemsley-Brown, 2018).

Digitalization has resulted in experiences going beyond cognitive and affective experiences since it includes customers' interactions with other people and gadgets through interactive devices by creating a collective sense of social presence (Bolton et al., 2018; Collier et al., 2018; Helkkula et al., 2012). Social presence refers to the warmth, sociability, and feeling of human contact offered by sensory attributes on digitalized platforms to increase the psychological closeness with the customer during the process of value co-creation (Bleier et al., 2019). Firms are using social CRM (customer relationship management) for enhancing collaborative relationships with customers by engaging through suitable technologies and social media applications (Lao et al., 2021; Wang & Kim, 2017; Xie et al., 2016i).

Customers are concerned with easy accessibility, navigation, and non-monetary costs while co-creating value using digitalization (Grewal et al., 2020). Complementary technologies like Quick Response (QR) barcode, online payment systems, social media applications and big data analytics help to create fast and user-friendly experiences (Ye et al., 2018). Digitalization has resulted in the deployment of Artificial Intelligence (AI) that tries to predict what the customer is seeking even if they are not able to articulate their need fully (Gursoy et al., 2019; Huang & Rust, 2022; Lee et al., 2022; Sampson & Chase, 2020). A host of new technologies such as Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), virtual assistants, chatbots, and robots, which are typically powered by AI, are dramatically transforming the customer experience through better human-machine collaborations to ensure value co-creation (Hoyer et al., 2020; Noble et al., 2022). The integration of technology has resulted in enhanced customer value through a combination of reality-virtuality technologies that empower customers by making the experience part of their context (Flavian et al., 2017). Socialbots are playing the role of customer service agents and resolving issues faced by customers (Wilson-Nash et al., 2020).

Personalized approaches in digitalization can be deployed for better management of the customer's emotions and help to create desired customer experiences (Pappas, 2018). For compelling co-creation experiences, the contextual issues of individual customers need to be understood, and suitable intermediation needs to be planned (Lipkin, 2016). Firms are trying to build personalized customer experiences with the help of longitudinal information that has been gathered and analyzed (McColl-Kennedy et al., 2015; Scholz & Smith, 2016).

4.2.3 Theme 3: Value co-creation through brand communities

Digitalization has resulted in a new set of challenges for brands owing to the creation of a new form of customer-brand relationships (Coelho et al., 2018). Customers form relationships with brands that mirror their social relationships, and digitalization has facilitated interactions among customers through brand communities (Payne et al., 2009). Brand communities comprise geographically distanced customers sharing their opinions, feelings, experiences, and knowledge about the brand on digital platforms (Iglesius et al., 2017; Tafesse & Wien, 2018). When brand community members share brand stories, it helps create value through improved brand meaning (Akman et al., 2019; Chou et al., 2022; De Vries & Carlson, 2014; Karampournioti & Wiedmann, 2022; Shao et al., 2015; Wu et al., 2021). Brand stories on brand communities focus on brand experiences, outcomes and meaning to brands, and other customers link these with their own experiences, resulting in self-brand connections (Eelen et al., 2017; Granitz & Forman, 2015; Sicilia et al., 2016). Members with stronger self-brand identification show greater support for the brand and engage in extra-role behaviours like brand advocacy on brand communities to fulfil the need for belongingness and social affiliation – the archived content is the aggregate of collective expertise and knowledge (Coelho et al., 2018; Jiao et al., 2018).

Customer knowledge sharing denotes a customer's communication of specific brand knowledge for others in the network, whereby value gets created for others (Hollebeek et al., 2019). Knowledge exchanges can help members learn lesser-known benefits offered by the brand, gain expertise and achieve well-being through hedonic, social and self-efficacy value (Chou et al., 2022; de Almeida et al., 2018; Tafesse & Wien, 2018). Brand community members who do not participate actively also identify with

the brand community and benefit from self-enhancement through group-based self-esteem (Karampela et al., 2018; Mousavi et al., 2017). Customers experience hedonic value through perceived enjoyment and excitement by engaging with brand communities (Carlson et al., 2019).

Interactions on brand communities through digital platforms are behavioural manifestations of brand engagement that go beyond purchase – cognitive (thinking about the brand), emotional (feelings for the brand) and behavioural (energy, time and efforts customers spend on the brand) (Eigenraam et al., 2018). Value created through thoughts, deeds and rituals of customers on brand communities creates a shared consciousness and builds brand equity (Dessart et al., 2019; Marbach et al., 2019; Skalen et al., 2015). The brand community norms include reciprocity, voluntarism, and social trust, and over time, social value exceeds the informational value in these communities and enhances the brand equity (Hollebeek & Macky, 2019; Tseng et al., 2017).

4.2.4 Theme 4: Relationship benefits and loyalty rewards

Customer value includes relationship benefits, and customers evaluate efforts taken by the firm for maintaining relationships, particularly in digitalization-enabled relationships (Chen et al., 2017; Wielgos et al., 2021; Wu et al., 2014). Relationship benefits are those benefits that customers receive beyond the core offering of the firm and are derived from an established, long-term relationship with a firm. When customers engage in long-term relationships with firms, they can experience confidence benefits, hedonic benefits and special treatment benefits (Gwinner et al., 1998). Digitalization enables customers to access detailed product information, customize their searches, and save their purchase histories, leading to confidence benefits (Hult et al., 2017; Verma et al., 2016). The fun, playfulness and entertainment value of digitalized platforms can lead to hedonic benefits (Pereira et al., 2016). Digitalization helps firms to offer special treatment benefits that include faster services or special prices, and these relationship benefits are valued by customers (Chaudhuri et al., 2019). Relationships on digitalized platforms can feel intimate and emotionally rich when firms build trust through personalization and address customer concerns, resulting in social bonding (Bandara et al., 2020; Verma et al., 2016; Olavarria-Jaraba et al., 2018; Zhang et al., 2020).

Digitalization enables customers to co-create value, and the immersive and intense nature of virtual environments creates cognitive and affective experiences that lead to loyalty and cross-buying (Bilgihan et al., 2-016; Lim et al., 2022; Liu & Sese, 2022; Mostaghel et al., 2022). Concerning loyalty rewards, customers invest time and effort to participate in loyalty programmes on digital platforms and are concerned about the nature and timing of the rewards (Yang et al., 2019). The different types of loyalty rewards help to cater to the diverse needs and goals being pursued by different customers. The types of loyalty rewards include cognitive rewards (monetary benefits), hedonic rewards (evoking emotions like cheerfulness and excitement), and symbolic rewards (preferential treatment) (Stathapoulou & Balabanis, 2016). Digitalization has resulted in firms rewarding loyal customers through points (accumulation of reward points based on transactions), labels (descriptive and hierarchical identification systems) and badges (descriptive and horizontal identification systems) (Hanson et al., 2019; Septianto et al., 2019). Labels and badges are symbols that enhance the status of a customer to others on digital platforms and self-enhancement drives customer value (Hanson et al., 2019).

Digitalisation has helped firms to create structured loyalty programmes and personalize loyalty rewards to suit the needs of individual customers (Kumar & Reinartz, 2018). Digitalized interactions help firms to interpret the customer's level of loyalty and are forewarned about customers at risk of churn (Schweidel et al., 2022; Toufaily et al., 2013). When firms reward customers for their loyalty, it enhances customer value (Ramaswami & Arunachalam, 2016; Suh & Yi, 2012). Customers make a judgment about value through longitudinal assessment of relationship benefits and loyalty rewards.

Based on the four themes discussed above, an integrative conceptual framework is presented in Figure 4.

4.2.5Aligning the findings with recent scholarly work

Recent scholarly contributions further substantiate and reinforce the key themes identified in our literature review. These studies offer both empirical evidence and theoretical insights that validate the relevance of the themes explored, thereby strengthening the credibility and robustness of the conceptual framework illustrated in Figure 4.

To support customer goal fulfilment through customized solutions, Gensler and Ramaswamy (2025) emphasize the importance of sequenced digital solutions that mirror the stages of the customer journey. This approach allows firms to deliver timely, relevant interventions that align with

evolving customer needs. Complementing this, Homburg and Tischer (2023) emphasize the role of dynamic journey management using digital tools to ensure consistent value co-creation across touchpoints and in the domain of personalized customer experiences, emerging research points to the growing impact of AI-enabled technologies. Srivastava and Pal (2024) highlight how AI tools enhance service interactions, offering personalized and intuitive support that improves customer satisfaction and loyalty. Similarly, Maduku et al. (2024) suggest that emotionally intelligent digital assistants can manage customer emotions, deepening engagement and trust. When it comes to value co-creation through brand communities, Furrer et al. (2024) stress the need for effective governance of customer-customer interactions in digital spaces. With appropriate policies and monitoring, firms can harness online communities to foster authentic engagement and extract rich insights.

Finally, these findings reinforce the potential of digitally driven relationships and loyalty rewards in cultivating long-term customer commitment. The integration of AI and data analytics enables firms to offer more meaningful, personalized rewards that reflect the evolving aspirations of their customers. Together, these studies affirm the robustness and contemporary relevance of the four themes, offering a solid foundation for future managerial strategies in a digitalized market.

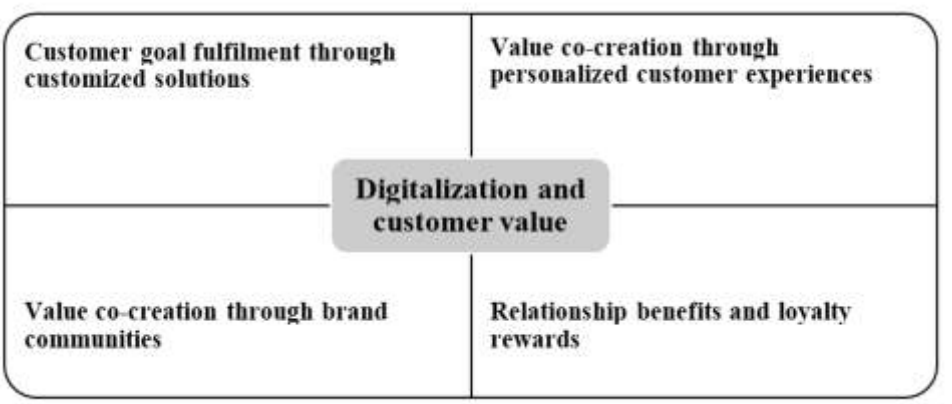
5. Research Propositions

Customer goal fulfilment through customized solutions-research propositions

Digitalization has enabled direct interactions between customers and firms, whereby the individual needs and preferences of customers can be taken into consideration for providing customized solutions. The closeness between customers and firms (facilitated through digitalization) can help firms understand the context of the customer and offer suitable solutions. Modern digital technologies (e.g. smart sensing, deep learning, etc.) can be leveraged to interpret the context of individual customers with more accuracy and precision. Therefore, it is proposed:

Proposition 1: Contextualized recommendations will help firms to fulfil customer goals

Further, customers are keen to achieve well-being, and firms can play a proactive role (facilitated through digitalization). Firms can consider the expectations of a customer from the point of view of well-being. Thereafter, suitable solutions can be developed by firms that would cater to a customer's requirements for attaining well-being. In order to enable a more profound understanding of customer desires, modern technologies may be deployed for better human-machine interactions (e.g. robots offering emotional support). Hence, it is proposed:



Source. Proposed by the authors

Figure 4. Digitalization and customer value – an integrative framework

Proposition 2: Firms will leverage digitalization to help customers fulfil their desires and achieve well-being

Value co-creation through personalized customer experiences – research propositions:

Digitalization has enabled personalized experiences for customers. In the current context, firms have been focusing on the use of immersive technologies to create more engaging experiences for customers. On the other hand, digitalization can be used to interpret the current moods and emotions of customers. Modern digital technologies (e.g. mixed reality applications) may be deployed in order to ensure more customer empowerment during interactions on digital platforms. Therefore, it is proposed:

Proposition 3: Immersive technologies will leverage customer emotions to enhance customer experiences

Customers interact with firms using digital technologies, but their context can differ from time to time. The relationship between customers and firms has been strengthened through social media. Innovative sensing technologies may be deployed to ensure better personalization as per the context of the customer. The value desired by customers may be personalized based on the context-specific requirements. Therefore, it is proposed:

Proposition 4: Digitalization will help to deliver personalized experiences to suit the customer's context

Value co-creation through brand communities – research propositions:

Digitalization has enabled customers to join online brand communities, and the exchanges provide an understanding of the real feelings that customers possess about a brand. The spontaneous nature in which conversations take place in these online communities can provide insights into the real brand knowledge possessed by customers. Modern technologies (e.g. deep learning) can be deployed to provide useful analysis of the customer-customer conversations on brand communities. Therefore, it is proposed:

Proposition 5: Opinion mining in online brand communities will help firms interpret customers' brand knowledge

Online brand communities provide a platform for engaging customers through various tools facilitated through digitalization. Modern digital technologies may be deployed to offer customers interactive tools (e.g. take brand selfies) to enhance brand engagement. The level of engagement can be indicative of the equity commanded by the brand. Therefore, it is proposed:

Proposition 6: The level of customer engagement in online brand communities will be indicative of the brand equity

Relationship benefits and loyalty rewards – research propositions:

Digitalization has enabled interactive one-on-one relationships between firms and customers. On the other hand, customers are seeking various benefits through their loyalty towards the firm. In a world that offers a plethora of choices and AI-enabled personalized recommendations, customers may expect one-on-one relationships to provide necessary advice and guidance that they can truly depend on. Loyal customers have faith in the firm, and they would rely on the genuineness of the advice for making important decisions in their lives. Therefore, it is proposed:

Proposition 7: Genuine and helpful advice to loyal customers will be driven through digitally enabled one-on-one customer relationships

Customer value desired by customers may change during their relationship with the firm. The one-on-one exchanges at regular intervals facilitated through digitalization will help firms to keep track of the changing expectations of customers. Furthermore, the rewards offered to customers can be developed by considering how they are trying to transform themselves and their lives. Therefore, it is proposed:

Proposition 8: Firms will leverage digitalized relationship management to offer loyalty rewards that can help transform the lives of customers.

6. Managerial Implications

The study offers significant insights for managers navigating the increasingly digital landscape of customer engagement. The four themes identified—customer goal fulfilment through customized solutions, value co-creation through personalized customer experiences, value co-creation through brand communities, and relationship benefits and loyalty rewards- present a framework for firms to leverage digitalization in creating and enhancing customer value strategically.

To begin with, digitalization enables firms to move beyond standardized offerings and develop customized solutions that align with individual customer goals. Modern technologies such as intelligent sensing, artificial intelligence, and machine learning provide firms with real-time insights into customer preferences, behaviours, and

contexts. Managers can utilize these insights to tailor products, services, and communications that resonate with customers on a personal level. This not only improves customer satisfaction but also strengthens brand loyalty, as customers feel understood and valued. Investing in platforms that support contextual personalization, such as recommendation engines or adaptive content systems, can help firms stay relevant and competitive in dynamic markets (Yang & Hu, 2024). Firms can appoint customer success managers in order to ensure satisfaction through the customization of products (Goad et al., 2024). Second, digitalization empowers firms to co-create value by offering personalized and emotionally engaging experiences. Through immersive technologies like augmented reality (AR), virtual reality (VR), and mixed reality (MR), firms can deliver experiences that are not just functional but also emotionally resonant (Jeseo et al., 2024). These technologies enable customers to interact with brands in more meaningful and memorable ways, whether by trying out products virtually, participating in gamified experiences, or navigating customized digital environments. Managers should explore how such tools can be integrated across digital touchpoints to enhance customer empowerment, satisfaction, and brand affinity. Further, the intensity of customer participation needs to be well-orchestrated by firms, else they may end up finding the experience too exhausting (Gunturkun et al., 2023).

Another critical area is the rise of online brand communities, which offer rich opportunities for value co-creation through peer-to-peer interactions. Customers are increasingly expressing their brand-related opinions, experiences, and expectations on digital platforms. These spontaneous exchanges can provide firms with unfiltered, authentic insights into customer sentiment and brand perception. Managers should monitor and analyze these conversations using tools like opinion mining and sentiment analysis to gain actionable intelligence (Guo et al., 2025). Additionally, firms can encourage deeper customer involvement by fostering vibrant communities, organizing interactive campaigns, and enabling user-generated content. This kind of participative engagement can amplify brand equity and build a sense of belonging among customers (Lin & Huang, 2024).

Finally, the development of digitally enabled relationship benefits and loyalty rewards has transformed how firms interact with their long-term customers. Digital platforms allow firms to engage in consistent, personalized, one-on-one communication with customers (Teepapal, 2025). This makes it possible to offer loyalty rewards that are not just transactional but transformative, supporting customers in achieving personal aspirations or life goals. Digital tools can help in fostering inclusiveness while delivering the services (Varadarajan, 2024). Managers should design loyalty programs that go beyond discounts and points, focusing instead on providing meaningful rewards and authentic guidance. For example, wellness brands might offer personalized coaching sessions, while financial service providers could deliver tailored investment advice based on life stage and goals. In summary, the four themes offer a roadmap for managers to embrace a more holistic and customer-centric approach to value creation in the digital era. By leveraging technology not just for efficiency, but for deeper personalization, emotional engagement, community building, and long-term relationship management, firms can foster enduring customer loyalty and sustainable competitive advantage.

7. Conclusion

This paper reviewed articles from 2006 to 2022 in business and management journals and proposed four themes of creating customer value in the context of digitalization. The paper has differentiated itself from existing literature by outlining the contributions of earlier researchers in the four identified themes. It has also classified literature based on publication year and the identified themes. Thus, it is helpful for both researchers and practitioners.

Customer value is no longer a unidimensional concept of trade-off between cost and benefits (Vargo et al., 2017). Instead, this entails social aspects and relationships and customized customer experiences (Rangaswamy et al., 2020). Digitalization has enabled both firms and customers to share information and experiences, engage with each other and other customers through an interactive process and help co-create value to fulfil individual customer goals (Delpechitre et al., 2018; Rangaswamy et al., 2020). Based on the review of the literature and subsequent consultation with three industry experts, the study proposes a framework with four theme of value creation in the context of digitalization: 'customer goal fulfilment through customized solutions', 'value co-creation through personalized customer experiences', 'value co-creation through brand communities' and 'relationship benefits and loyalty rewards'.

This paper posits that digitalization can enable firms to engage in more meaningful relationships with customers by helping them fulfil their goals and achieve well-being. Further, digitalized platforms and social media avenues have permitted firms to enhance their relationship beyond the products or services they are selling (Sanchez-Gutierrez et al., 2019). Digitalization can be leveraged to deploy immersive technologies that can help firms keep track of the reactions of customers during online interactions. In the current context, customers are engaging with brands by participating in online brand communities facilitated by digitalization. Firms can plan to track brand knowledge and brand equity through the conversations and opinions expressed by customers in these online brand communities. Finally, the one-on-one relationships between customers and firms through digitalization can be leveraged to keep track of the customers' changing expectations concerning customer value. The nature of rewards from the point of view of loyal customers can also be discerned through these one-on-one relationships.

The current study has several limitations, as is the case with any study. This study was based on peer-reviewed papers and excluded other sources of knowledge related to customer value and digitalization, such as books and conference proceedings. Though care was taken to consider all related journals, a few publications in related areas may have been excluded. Despite these limitations, we sincerely hope that this study will offer a meaningful contribution to the literature by proposing a framework on customer value in the context of digitalization.

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Role of Message Strategy on Consumer Green Behaviour: New Insights and Research Directions

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Abstract

Over the last decades, the concept of message strategies like message framing and message tailoring has gained prominent attention in fostering environmental behaviour change. Practitioners and academicians are interestingly exploring ways to implement communication strategies based on message frames in encouraging sustainable practices. However, its applications generated mixed findings in the extant literature. Therefore, we aim to explore the factors that affect the successful development of message strategies for the promotion of green behaviour. Through the present work, we provided an exhaustive summary of the extant literature through the use of bibliometric analysis and Theory, Characteristics, Context, Methodology (TCCM) approach and classified the existing work in the area of message frame in encouraging behaviour change for the achievement of sustainable development goals (SDGs). We also proposed an integrated framework that will help to develop a set of general ideas on which further work can be based to devise strategies to improve sustainability.

Keywords: *Sustainability, Green Communication, Messaging Strategies, Environmental Behaviour Change*

1. Introduction

The attainment of the Sustainable Development Goals (SDGs) promoted by major global forums is one of the priority agendas of corporations and policymakers (Ülkü & Hsuan, 2017; Spielman, 2020). Policymakers and corporations have been incorporating macro and meso-level initiatives like laws and regulations, market-based approaches, micro-level initiatives, etc., targeting the end consumers through educational programs and information campaigns (Dangelico & Vocalelli, 2017). Practical and tailored green communication with people at large is the key to any environmental program's success in promoting green behaviour. Recently, more focus has been given to less costly policy tools frequently employed in behavioural economics (e.g., nudges) that use non-price changes (Thaler & Sunstein, 2009).

Environmental programs are becoming an essential way through which the government, public and private sectors are raising public awareness and aiding in developing a positive cognitive and affective attitude toward promoting green behaviour. These programs are designed and implemented to promote sustainable development to overcome environmental issues like pollution, climate change, biodegradation, etc., and a massive investment in money, time, etc., is made to enhance their reach. It is critical to send the right message at the right time to the right audience for the success of any campaign. However, as noted by various researchers (Haines, Kuruvilla, & Borchert, 2004), the messages used in these programs are rarely based on research evidence, and their reach is less.

The factors that act as obstacles to the promotion of green behaviour are 1) people are not wholly informed of the negative consequences of environmental degradation and how it affects the quality of human life and well-being, 2) knowledge about the means to address the environmental issues to the general public is also limited 3) majority of the consumer express willingness to promote green behaviour, however the same is not reflected in actual behaviour. Therefore, researchers believe that while promoting green behaviour, the challenge lies in persuading consumers to take immediate necessary actions to benefit society (Davis, 1995). Therefore, considering the heavy expenditure and the high risk of not practising green behaviour, it is crucial to guide marketers and other environmental practitioners in designing and framing effective messages for promoting the various environmental programs. Two critical perspectives must be considered while creating a message: framing and tailoring. However, the conceptualisation of these two terms in the environmental disclosure is inconsistent. From the research gaps identified, the present work addresses the following important research questions:

RQ1. How has the concept of 'message frame' in the context of sustainable behaviour change come and evolved to date, and what does the extant literature provide to us?

RQ2. What are the different theories, contexts, characteristics and methodologies (TCCM) applied in the literature on message frames in promoting green behaviour to identify the important knowledge gaps and future research agendas?

Thus, the article aims to shed light on using message framing and message tailoring to promote green behaviour. The theories of message framing effects act as a theoretical base for developing the conceptual foundation. This conceptual framework aims to systematically guide researchers in effectively communicating green behaviour at each stage, from generating awareness, creating recognition, changing beliefs and attitudes, enhancing behaviour intention, and final implementation and action.

The flow of the paper is discussed here. The first section describes the introduction and importance of achieving sustainable development goals, consumers' role in attaining the SDG goals, and how message framing can nudge behavioural change. The second section describes the methodology adopted to extract the relevant literature on the message frame and green/sustainable behaviour. We used the bibliometric analysis and TCCM (Theory-Characteristics-Context-Method) approach to review the literature, build insights, and suggest future research directions. The following section presents an integrative framework for understanding the role of message strategies, namely message frame and message tailoring, the process involved in influencing sustainable consumer behaviour. Lastly, we proposed a conceptual framework with propositions based on the research gaps identified that could be further tested.

2. Methodology

We have used the bibliometric analysis as it helps in gaining a '*static, transparent and systematic picture of the research*' (Singh & Dhir, 2019) and TCCM to organise the literature on the use of massage techniques like message framing and message tailoring in promoting green behaviour (Sun & Grimmes, 2016; Knight et al., 2004). We referred to Scopus

to search the articles published on message framing in green behaviour from 2010 to January 2022. The query employed to extract the relevant articles are *'(Abstract-Title-Keyword ("Message Frame"))'* OR *'(Abstract-Title-Keyword ("Message Frame + Green Behaviour"))'* OR '(*Abstract-Title-Keyword ("Message Frame + Sustainable Behaviour"))'* OR '(*Abstract-Title-Keyword ("Message Strategies"))'* AND '(*Abstract-Title Keyword ("Message Tailoring in Green Behaviour"))'*. Since the present work limits its scope to only using message strategies in green behaviour, we chose the keywords. The extracted articles based on the above keywords helped us identify the relevant concepts, trends, processes, antecedents, consequences, and moderators related to our study's construct. The total number of articles generated from Scopus based on the above keywords is 256. We also applied various filters such as "Business Management and Accounting", language "English", and type "Journal", which further narrowed down the number of articles to 136. After reviewing all the abstracts of the selected articles, a total of 49 articles were thoroughly examined. The resulting list of journals includes *'Management Communication Quarterly, the Journal of Neuroscience, Psychology, and Economics, Journal of Social Marketing, Journal of Marketing Communications, Corporate Communications, Journal of Risk Research, Journal of Promotion Management, Journal of Organizational Effectiveness, Journal of Advertising, Journal of Business Research, Journal of Tourism Futures, International Journal of Pharmaceutical and Healthcare Marketing, Developments in Marketing Science: Proceedings of the Academy of Marketing Science, Dietrich, Journal of Consumer Marketing, Tourism Review, Journal of International Consumer Marketing'* etc.

We applied the TCCM framework where *'T denotes theory, C denotes Context, C denotes Characteristics, and M denotes Methodology'* (Knight et al., 2004) to identify the research gaps and highlight future research directions.

3. Results of Bibliometric and TCCM Analysis

3.1 Theory

There exists no concrete theoretical framework to guide marketers' message-framing strategy. However, the most widely used theories in this area are prospect theory, elaboration likelihood model, self-regulatory theory, construal theory, etc., to account for the interaction of the characteristics of the message and receiver.

- The prospect theory (Meyerowitz & Chaiken, 1987; Tversky & Kahneman, 1981), the most widely used theory in message framing research, argues that the way messages or risky outcomes are framed or presented as potential gains or losses can influence the behaviour of an individual depending on the risk-taking ability of that individual.
- As per the information processing framework, *'systematic processing entails careful consideration of issue-relevant arguments," and 'heuristic processing involves using cognitive shortcuts'* (Chaiken & Ledgerwood, 2012, p. 217). The level of involvement guides the information processing of the message.
- According to the self-regulatory framework (Higgins, 1997), people's regulatory orientation (prevention vs. promotion) predicts their sensitivity to positive and negative message frames.

Existing literature guiding the message strategies for environmental behaviour change has used the theoretical frameworks, namely Trans-Theoretical Models (Prochaska & DiClemente, 1982), Theories of Reasoned Action and Theory of Planned Behaviour (Fishbein & Ajzen, 1975; Ajzen, 1991); Social Cognitive Theory (Bandura, 1986), altruism, etc. that act as a base for guiding the message tailoring strategies for environmental behaviour change. However, they usually ignore the personal characteristics of the receiver that can influence behaviour change. In addition, theories like construal level theory and self-determination theory can also guide the environmental behaviour of an individual.

3.2 Message Framing

3.2.1 Definition

The theoretical construct of message framing was first identified by Burke (1937). However, after Goffman's (1974) work, it was recognised and has widespread use as a central construct across various organisational and management disciplines, ranging from work in decision-making, managerial cognition, strategic management and social change (Cornelissen & Werner, 2014). Framing means *'remaining true to the underlying science of the issue while applying research from communication and other fields to tailor messages to different audiences' existing attitudes, values, and perceptions'* (Nisbet, 2009, p. 14). The

message-framing technique often focuses on the varying aspects of the same issue (usually referred to as a topical frame) and the different levels of abstraction (Schäfer & O'Neill, 2017). The four factors that are to be considered in designing a message frame are the level of the risk involved in indulging in a particular behaviour, frame of reference self vs. others, stage of change (SOC) of the receiver, level of experience and knowledge of the receiver and gender of the receiver (Cheng, Woon & Lynes, 2011). The construct message framing can be dealt with at a micro, meso, and macro level. This construct shapes individuals' perceptions, beliefs, and attitudes at the micro-level for a particular context. At the meso level, this construct is used to frame actions and social identities and persuade others to follow suit. Finally, at the macro level, this construct guides the behaviour through rules in a particular social setting.

3.2.2 Typology of message framing

The typology of message frames, as described by Levin et al. (1998), distinguishes message framing as 'attribute framing, goal framing, and risky choice framing'.

- Attribute framing (positive vs. negative) involves framing in terms of the characteristics or features of an event or object. For example, a chocolate bar can be framed as *'80 per cent fat free'* (i.e., a positive frame) and *'20 per cent fat'* (i.e., a negative frame) (Braun et al., 1997). This type of framing has vast implications for product evaluation, scenario analysis, and resource availability (Marteau, 1989).
- Goal framing (promotion vs. prevention) involves the message framing method, where the likely outcome or consequences of the action or behaviour are described. For example, when a positive goal frame is used, it describes the benefit gained from using a product, such as how an 80 per cent fat-free chocolate bar can help an individual lose weight.
- Risky choice framing (gain vs. loss) relates to the outcomes of the choice under uncertainty or with different levels of risks and has its roots in the prospect theory of Kahneman and Tversky (1979). For example, adopting recycling behaviour can be promoted through a gain frame, such as *'if you recycle, you conserve natural resources,'* or a loss frame, such as *'if you do not recycle, the environment will deteriorate.'* The two messages provide information on supporting the behaviour of recycling; one underlines the gains of adopting the behaviour, whereas the second is directed at the expense of not behaving in the prescribed manner. This type of framing has implications for the impact of persuasion and the comparison of the behaviour's adoption rate. The effect of different types of framing is different on the promoted behaviour. Therefore, it is essential to consider only one framing time when comparing the results. Thus, this outline will focus on risky choice framing in promoting green behaviour.
- The other types of message frames can be distinguished as Distant Frames, Emotional Frames, and Problem Severity/Problem Solution Frames.

3.2.3 Literature related to Types of Frames

3.2.3.1 Risk Choice Frame (Gain/Loss)

A study by Lord (1994) found that benefit frames result in more favourable attitudes toward recycling than loss frames, while loss-framed messages from a personal acquaintance were most effective in influencing actual recycling. Siegev et al. (2015) explored the role of message framing, frame of reference and product involvement. Blose et al. (2015) found that loss-framed messages encourage hotel guests' decision to engage in linen-reuse programs compared to gain-framed messages. Grazzini et al. (2018), relying on the prospect and construal theories, explored how construal level (abstract vs concrete) moderates the gain vs loss frame behaviour of hotel guest recycling behaviour.

3.2.3.2 Attribute Frame

Okada and Mais (2010) explored the role of environmental consciousness and message framing. They suggested that positive framing is effective for environmentally conscious consumers while negative framing is effective for less ecologically conscious consumers. White et al. (2011) found that non-positively framed messages are more influential than their positively framed versions, mainly because the receiver of the message filters the former messages in greater detail and feels more surcharged about their contributions. Olsen's (2014) findings suggest that positively framed messages are less effective in changing brand attitudes than messages highlighting the absence of environmentally harmful attributes. Kim & Kim (2014) found that positive messages (gain-framed) from a credible

source are better able to affect guests' pro-environmental behaviours (i.e., visit intentions and water and energy saving. Pedrazzoli and Ronconi (2021) found that the success of the positive frame message depends on the product category.

3.2.3.3 Goal Frame

Chang et al. (2015) explored the role of construal level, message frame and environmental concern. Jacobsen et al.'s (2018) findings highlight the use of positive messaging in digital media campaigns and also found that gender and level of involvement of the audience do not affect environmental conservation. Lee et al. (2018) explored the role of product type, i.e. utilitarian and hedonic and consumer regulatory focus, i.e. promotion and prevention, in understanding the role of message framing. Nab et al. (2020), with the help of framing theory, message processing theory and regulatory focus theory, check the relationship between outcome framing on the intention with the point of reference and regulatory foci as moderators in the context of house heating systems.

3.2.3.4 Distant Frame

Davis (1995) explored the role of the message frame and frame of reference as current vs future generation in his study. His findings suggest that loss to the current generation positively responds to conservation behaviour like recycling. Loroz (2007) explored the role of the message frame and frame of reference as self vs. other and found that negative frames may be more effective with self-referencing appeals. In contrast, positive frames are effective when benefits to oneself, unlike others, are focused. Xue et al. (2015) explored the effects of message framing (positive vs. negative) and appeal types (individualistic vs. collectivistic) in green advertising. He found that when individualistic appeals were used, ads with negative message frames generated more favourable responses than ads with positive frames.

3.2.3.5 Emotional Frame

Baek and Yoon (2017) found the interaction effect between negative emotions, guilt and shame and the message frame. Participants who were provided with a clue related to guilt expressed more inclination to conserve water after they watched a gain-framed water conservation ad; participants who were provided with cues related to shame exhibited more inclination to conserve water after they viewed a loss-framed ad. Amatulli et al. (2017) suggested that negatively framed messages are more effective than positively framed messages, and anticipated shame is the emotion responsible for this. Nabi et al. (2018) explored the role of emotional appeal framing in climate change communication, namely hope and fear. Amatulli et al. (2019) explored the role of shame in negative green message framing and how the type of product and environmental concern moderate the relationship.

3.2.4 Moderators

Wolske et al. (2018) found that tailoring messages is more effective than reframing the financial consequences in the context of PV as a long-term investment. Holland et al. (2019) explored the role of personal experience, scarcity, and message frame in water conservation. Huang et al. (2019) examined the role of message frame, point of reference and modality in driving recycling behaviour. Jain et al. (2020) analysed the impact of using rounded and non-rounded numbers in communication messages on consumers' evaluation and judgement. Through the meta-analysis, Xu and Huang explored the effectiveness of the message frame in charity advertising. Van Esch et al. (2021) explored the role of message frame and political ideology (liberal vs conservative) in influencing donation intent, with a state of anxiety as a mediator. Huang and Liu (2022) explored how message framing, level of uncertainty, and type of agency involved (local vs national) influence the campaign effectiveness of the COVID-19 vaccine. Hence, it can be inferred from the above findings that the effect of message framing in environmental disclosure is contradictory and contextually sensitive. Therefore, it is essential to understand the underlying mechanism under which the impact of the message frame on green behaviour can be enhanced, mitigated or muted.

3.2.5 Message Tailoring and Stage of Change (SOC) Process

Most information about environmental problems and ways to overcome them is provided to the consumers based on the knowledge deficit model, which assumes that people are generally unaware of the environmental issues that our planet is facing and how to overcome them. They will be persuaded to adopt it if they are simply informed about it (Schultz, 2002). Recent works have argued that information provision alone is ineffective in instilling behaviour change (Schultz, 1998). A more effective strategy for behaviour change is tailored information (Winett, Love, & Kidd, 1983). Literature has documented that when resources are

available, message tailoring is an appropriate way to create messages for persuasion (Rothman & Salovey, 1997). Since all consumers are not alike, different messages are needed to persuade them, and message tailoring is one of the effective ways to promote a desired behaviour or change behaviour based on consumers' existing traits. It has been found in the existing literature that message tailoring has received less attention from research scholars. However, researchers also agree that tailored messages are more effective than generic messages in persuading consumers (Sohl & Moyer, 2007). Besides, the previous studies have also concentrated on only one or a few effects without integrating the impact. The ultimate goal of any environmental program is to persuade consumers to act by exhibiting actual behaviour. Therefore, an integrative perspective is needed to gain a holistic view of approaching green behaviour.

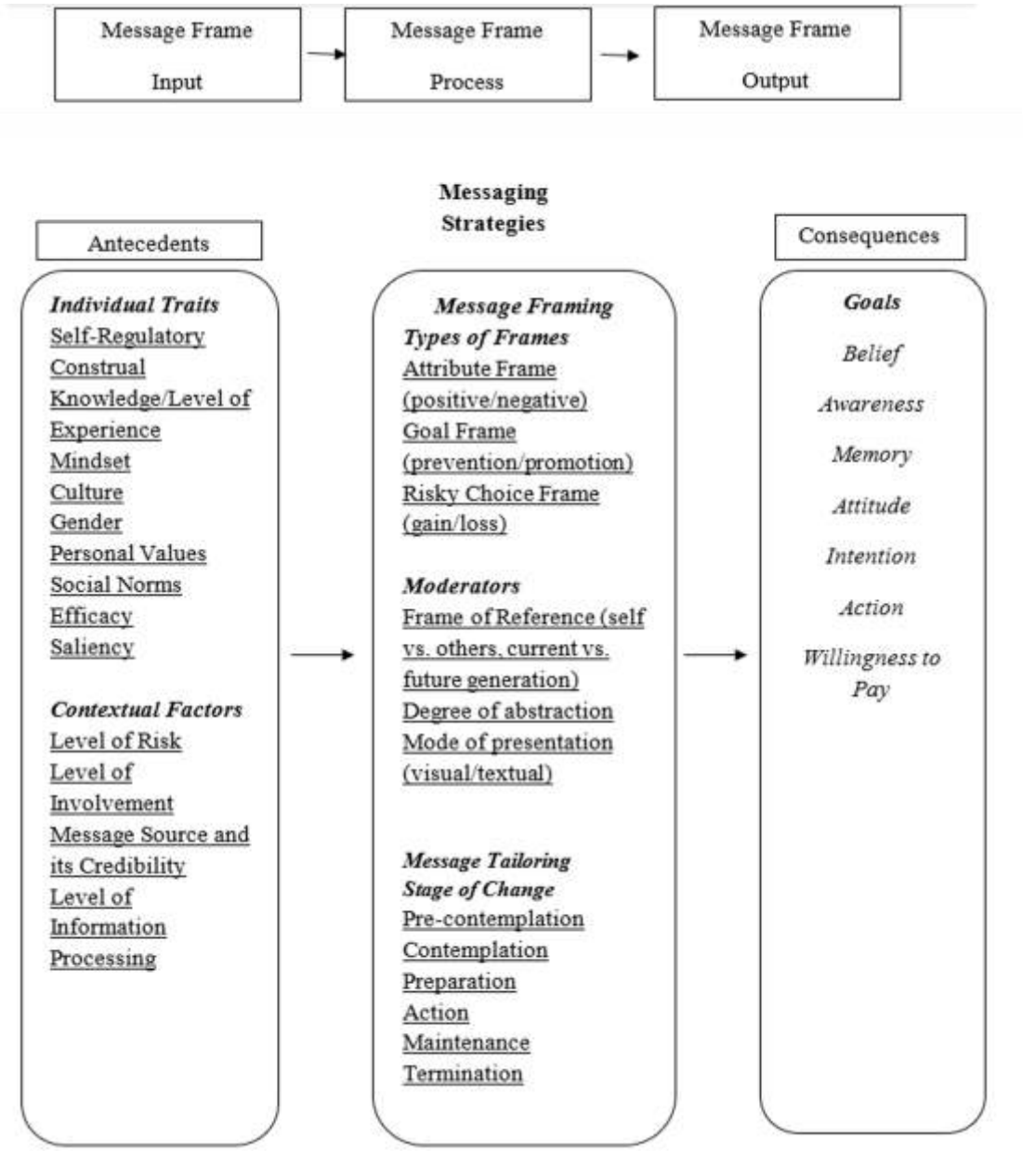

Figure 1. Messaging Strategies: An Integrative Framework

4. Future Research Directions based on the TCCM Approach

We used the TCCM framework to outline future research agendas based on the critical evidence collected from the bibliometric analysis.

4.1 Theories

Prospect theory, advocating loss aversion, is endorsed by most studies. We identified that many existing studies did not mention any theory that guided their study. Therefore, we propose creating theoretical integrations to develop the overarching model**.** Consumer behaviour theories, namely self-construal theory, social learning theory, motivation-opportunity-ability theory, information processing theory, attribution theory, etc. that are scarcely used in this domain could be further explored as a theoretical extension to build multi-theoretical research designs. Furthermore, a meta-analysis could be done to gain insight into the theoretical underpinnings.

4.2 Characteristics

As identified from the extant literature, most research focuses on the gain/loss framing technique, and the studies mainly focus on measuring consumer behavioural intentions. We suggest that comparison studies of different message frames are needed to understand the best message fit. As shown in Figure 2, the value-based, emotional, and social norm frames are understudied. Besides, other essential outcome constructs, namely behavioural (e.g., engagement, adoption, and continued use) and societally relevant (well/ill-being) outcomes, can be measured using longitudinal studies. Cross-cultural studies could also be explored to generate valuable insights.

4.3 Context

Green hotels, energy saving behaviour, or household energy use - the most used research context. Banks, credit cards, mortgages, charitable giving, transport, agri-food, and consumer products are potential sectors that could be explored through different message-framing and promotional scenarios. Therefore, we propose that digital or interactive media could be explored. Many studies have focused on students or a particular segment of customers to understand the interaction between framing and customer segments (gender, age, etc). B2C is the key focus of most studies. Besides, specific product categories like apparel, green personal care products, etc., and the service industry could be explored. Complex product vs. simple products: how the responses differ for radical innovation vs incremental innovation depending upon the level of risk involved. How pre-existing attitudes towards a product category can govern the behaviour and influencing such pre-existing attitudes through a message frame could be challenging. By applying framing theory in a new context (i.e., online banking, financing, retail), new campaign success determinants can be provided that can act as evidence for the moderating role of the project category. Most studies have been done in the US, UK, Canada, Australia, China, Sweden, Switzerland, etc. Emerging markets and developing nations like Asian countries can be targeted, and cross-cultural studies could be explored.

4.4 Methodology

From the extensive literature review, we identified that scenario-based experiments in controlled settings are used mainly in most studies but lack generalisation. Therefore, we propose that future studies can control the pre-exposure characteristics of participants by including control variables and the measurement timing. Besides, stated behaviour is noted that leads to social desirability bias. Therefore, experiments in natural settings could be explored in future research studies. Furthermore, in-depth qualitative content analysis of the launched campaigns could be done to measure the impact of communication strategies on the likelihood of campaign success while controlling for variables. Other methods like case studies, netnography, and implicit association tests could be explored for more insights into the area. Lastly, longitudinal studies and multi-method research designs are needed in this area.

Table 1 below highlights the future research agenda based on TCCM.

Table 1. Future Research Agenda Highlights

Theory	Characteristics	Context	Methodology
Self-construal theory, regulatory theory, social learning theory, Motivation-Opportunity-Ability theory, Information processing theory, Attribution theory, etc	Comparison studies of different types of message frames, like value-based, emotional, and social norm frames, that are understudied to understand the best message fit. Behavioural outcomes (e.g., engagement, adoption, and continued use) and societally relevant outcomes (well/ill-being) can be measured using longitudinal studies. Cross-cultural studies	Bank, credit cards, mortgages, charitable giving, transport, agri-food and consumer products Specific product categories like apparel, green personal care products, etc., as well as the service industry, as a moderator New contexts like online banking, financing, and retail Emerging markets and developing nations like Asian countries can be targeted, as well as cross-cultural studies. Complex product vs. simple products	Experiments that control the pre-exposure characteristics of participants by the inclusion of control variables and the timing of measurement Experiments in natural settings In-depth qualitative content analysis of the campaigns Case study, Netnography, Implicit association test Longitudinal studies, multi-method research design

5. Discussion and Conclusion

To our knowledge, we identified very few articles specifically reviewing the role of message frames in green consumer behaviour (e.g., Homar & Cvelbar, 2021). We also proposed a conceptual framework highlighting the critical and understudied areas as future research agendas in the role of message frames in environmental behaviour change. In the framework, we highlighted the moderating and contextual factors that help us identify patterns and analyse the knowledge gaps still missing in the literature. A comprehensive review suggests that using a message frame makes people attend to the message and persuade them to think about the issue and act accordingly (Petty & Wegner, 1998). To maximise the effectiveness of the message for behavioural change, we emphasise the consideration of multiple dimensions while framing the message and shaping the behavioural change through the various stages of the change process.

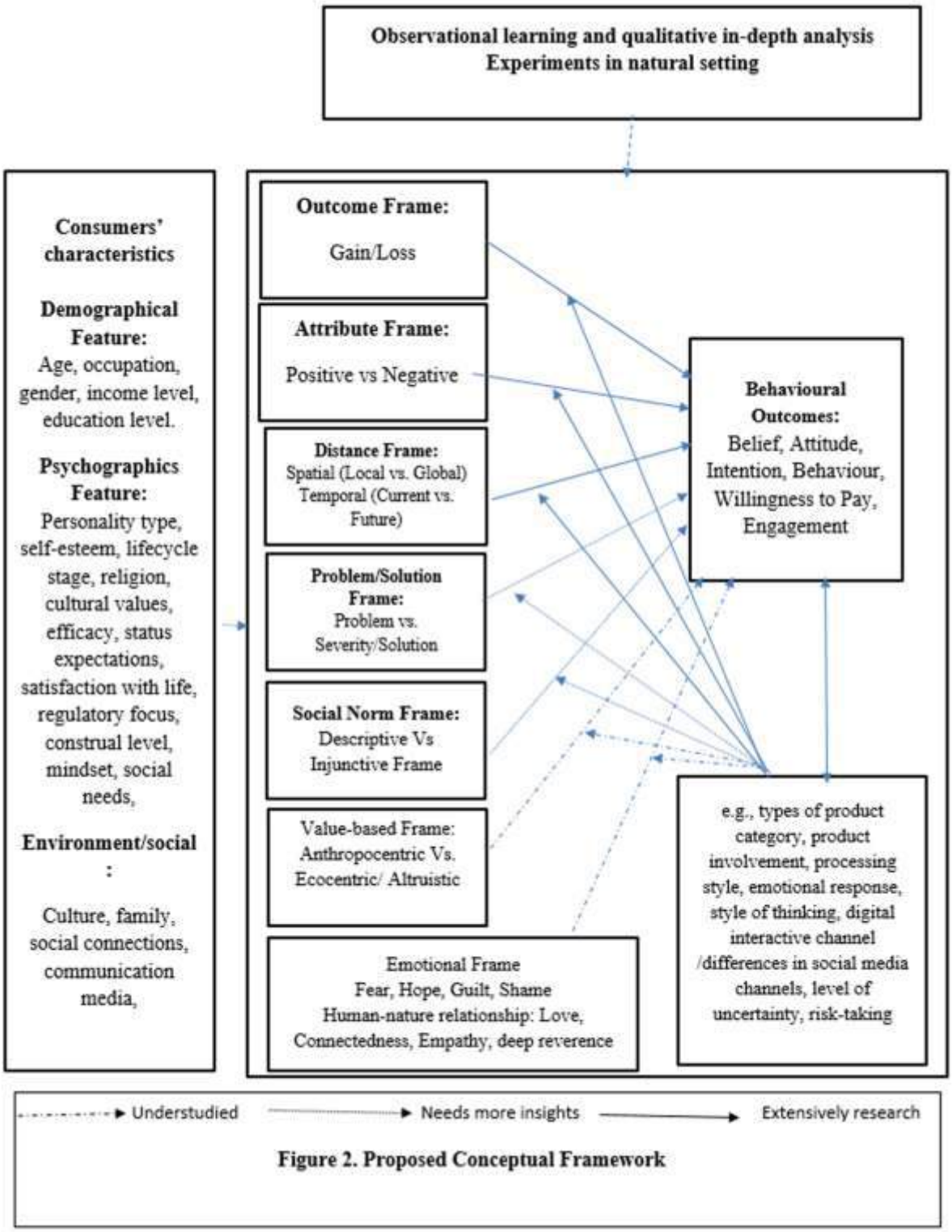

Figure 2. Proposed Conceptual Framework

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Integrated Reporting and Firm Value: Do Firm Size and Age Matter? Evidence from Indian Firms

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Abstract

The study aims to probe into the impact of integrated reporting quality on firm value and test the validity of firm characteristics as moderating variables for Indian-listed companies. The authors employed a panel data study of a sample of 75 listed companies, i.e. 225 firm-year observations, covering financial years from 2019 to 2022. The research concluded that integrated reporting quality, measured by the Pistoni Scoreboard, positively impacts a firm's value over the years, and the characteristics of that firm, i.e. size and age, also moderate the relationship between both the variables. This scoreboard was chosen as it assigns numerical values to the quality of information presented, making it easier for stakeholders to make informed decisions. This paper motivates managers to produce high-quality integrated reports as they positively influence the firm's value, which could result in the company's movement in a more profitable direction. The paper also offers significant insights for investors motivated to invest in companies that publish integrated reports. Since IR is practised voluntarily in India, the positive results of the research could equip policymakers to take steps towards making this phenomenon obligatory.

Keywords*: Integrated reporting, firm value, firm characteristics, Indian companies, quality, Pistoni scoreboard*

1. Introduction

Financial reporting before 2010 provided limited perspective to companies and investors; they could rely solely on quantitative data from a corporation's yearly and quarterly reports to make managerial decisions. As a result, new corporate reporting models started emerging, resulting in various reports like Corporate Governance Reports, Sustainability Reports, Business Responsibility Reports, etc. However, all these reports had non-financial deficiencies and could not explain the value created by companies in the medium to long term (Songini et al., 2020). So, to curb this deficiency, the International Integrated Reporting Council (IIRC) was instituted in 2010, which introduced the Integrated Reporting (IR) system. Under this process, the companies could publish non-financial data to build trust among various external stakeholders. This reporting process proposed to curb the communication gap of traditional financial reports, which were dissed for being excessively lengthy and lacking articulation, by combining economic and non-financial data into a solitary report (Zhou et al., 2017). The framework is prepared in such a way as to make the report evidence-based as well as outcome-based. With the introduction of IR, IIRC aimed to shift the companies' emphasis from short-term value creation to long-term and medium-term. This was done to work towards furthering organisational culture and incorporating external environmental factors into decision-making (IIRC, 2013).

Integrated Reporting has been implemented in many countries, either voluntarily or mandatorily. When it comes to research that studies IR in an obligatory setting, most of them use samples from South Africa as it is the only country where this phenomenon is mandatory (Girella et al., 2019). In contrast, very few studies are based on countries where IR is voluntary, including India. However, it has proved its utility in firm valuation in some countries where researchers believed this outcome-based system could attract investors for the longer term. Lee and Yeo (2016) found that IR positively relates to firm value in South African countries. This research was corroborated by Barth et al. (2017) in the same mandatory setting. However, the contracting research by Bijlmakers (2018) on European banking firms showed no significant relationship between the variables. A few other studies were undertaken in Nigeria, where IR is practised voluntarily, but nothing conclusive could be reported as different researchers suggested different results (Akpan et al., 2022; Jeroe, 2016). This creates ambiguity in their relationship, providing a vacuum for scholarly research.

Additionally, the research on the impact of IR is an area of prospect as there is still a lack of evidence (Rinaldi et al., 2018), especially in the context of firm value (de Villiers et al., 2017). The authors have addressed this issue in the current paper as they have established a relationship between the quality of IR and the firm's value. Since integrated reports also convey qualitative information, it becomes difficult to measure the quality of the report. So, to do that, a scoreboard was devised as per the framework given by IIRC (Pistoni et al., 2018), which was employed in our study. This scale has been used by very few studies in India, and that too in a limited sense. IR combines financial and non-financial (ESG) information to enhance stakeholder communication. In India, where companies frequently attract criticism for their lack of transparency, IR can lessen information asymmetry between companies and stakeholders (Kansal et al., 2014). IR prioritises value creation in the short, medium, and long terms. In this area, Indian companies are naturally trying to balance profitability and societal contributions (particularly with family firms and legacy enterprises). It facilitates linking company strategy, performance, and sustainability (de Villiers et al., 2014) and exerts pressure on businesses to internalise integrated thinking and alignment of departments. India offers a diverse corporate environment—from multinational conglomerates to MSMEs. This is the first of its kind study for Indian companies. Given the short-lived background of IR, the research in this area is still not profuse. Much of the research revolves around papers giving insights for future research (Vitolla et al., 2019b; De Villiers et al., 2022) or providing a systematic literature review of previous studies, limiting the novelty in IR research.

A few researchers studied the moderating impact of a firm's characteristics on the relationship between the quality of the report and the firm's value (Lee & Yeo, 2016). However, to our knowledge, this has not been tested in an Indian setting. Research on firm characteristics is relevant to signalling to companies about their financial and fundamental upkeep. With this objective, firm age and size have been employed in our study as moderating factors.

This study adds to the existing literature on IR in two directions. First, it broadens the research by creating a database of Integrated Reporting Quality (IRQ) Scores of BSE 500 companies which practice IR and assess its impact on the value of these companies. This can advance the understanding of other researchers of this incipient process where the existing literature is still lacking. Second, based

on the calculated scores, the study explores the new line of research by evaluating the moderating impact of firm characteristics on the relationship of IRQ and firm value of Indian-listed companies. This would expand the purview of the knowledge of practitioners intending to prepare an Integrated Report.

The rest of the paper is structured as follows: Section 2 provides evidence of existing theories backing the literature review and formulation of the hypothesis; Section 3 describes the methodology used for conducting research; Section 4 introduces empirical findings; and the paper closes with a discussion and conclusion.

2. Theoretical background, literature review and hypotheses

2.1 Theoretical Background

Numerous theories reinforce theoretical sustenance, and these are based on research outcomes.

Regarding contributions related to the relationship between IR and firm value (Lee & Yeo, 2016; Bijlmakers, 2018), the theoretical basis of this study is represented by agency theory. This theory propels that managers (agents) act on behalf of shareholders (principals) (Ross, 1973) and elucidates the justification behind managers' voluntary disclosure of information (Chow & Wong-Boren, 1987; Firth, 1980). The problems related to information asymmetry can occur between principal and agent, which are referred to as 'lemon problem' by Akerlof (1970). This can transpire because managers have more knowledge or information than corporate outsiders, such as investors.

IR aims to address these agency problems and reduce information asymmetry by publishing both types of company information, as discussed previously. In general, the disclosure of company information is used to meet market flaws and to reduce information disparity among corporate insiders and outsiders (Demartini & Trucco, 2017). Hence, it can be inferred that, following agency theory, if the contents of IR, namely, organisational overview and external environment, business model, risks and opportunities, strategy and resource allocation, governance, performance, outlook and basis of information (IIRC, 2013) are incorporated as non-financial elements of the report, the disparity in information can be reduced and this can contribute in enhancing the overall value of the firm.

Complementing agency theory, signalling theory also explains the said relationship. Where agency theory emphasises the importance of adopting IR from the investors' perspective, this theory focuses on informing of firm quality and value, not only to investors but to other stakeholders, including analysts (Spence, 1973) through voluntary disclosures. Insiders, like investors, put more weightage on the quality of information than the amount of information that the report discloses (Beretta & Bozzolan, 2008), and the quality of information can be signalled to the investors through high-quality IR reports, which confirms improved internal decision-making and indirectly leads to enhanced overall firm valuation. The positive relationship between market signal and firm value has been recognised in previous studies by Yeo and Ziebart (1995) and Frankel, Johnson, and Skinner (1999). In the context of moderating variables for the study, that are, firm characteristics, prior studies show that firm size coveys its ability, which signals the investors positively or negatively to invest in the said company and generates an impact on value. This statement is corroborated by Myers and Majluf (1984), who found that the problem of information asymmetry is not as complex in big firms as in small firms. Bin-Ghanem and Ariff (2016) have also used agency and signalling theories to link financial reporting and firm value.

2.2 Literature Review and Hypothesis Development

Based on the underlying theories discussed above, this literature review examines and integrates existing research applying these theoretical lenses to integrated reporting. The review illuminates how conceptual frameworks are translated into practical contexts through theory-practice application.

2.2.1 Integrated Reporting and Firm Value

Integrated Reporting focuses on value creation for various stakeholders over the short, medium and long term, integrating financial and non-financial information where six capitals, namely, financial, manufactured, natural, human, intellectual, social and relationship, are disclosed (IIRC, 2015). There are certain areas which provide a thorough analysis of IR. Another stream focuses on establishing the relationship between board characteristics and IR (Omran et al., 2021) who evidenced that board characteristics influence top management's decisions related to IR, which is further substantiated by agency theory while Girella et al. (2021) examined as to what degree board characteristics influence the choice of voluntary publishing of sustainability and integrated report, taking incentives towards corporate transparency, as moderating variable. A similar study was conducted by

Songini et al. (2022), taking the variable 'integrated reporting quality' and validating its positive relationship with board characteristics. This research was further validated by Erin and Adegboye (2021), who also opined that external assurance contributes to IR quality. IR is measured through two variables, namely, IR disclosure and IR quality. Pistoni et al. (2018) made an extinguishing contribution to IR research by developing the IR Scoreboard to analyse IR quality empirically. Research shows that Indian companies have required resources to adopt and execute IR practices as guided by IIRC (Ghosh, 2019) despite this concept being relatively new in the country and that the majority of companies have positive towards the implementation of IR in India (Mishra et al., 2021).

A company's performance is reflected in the metric of firm valuation, which is done by shareholders and corroborated by signalling theory. They usually obtain the needed information from a company's financial statements. However, Knauer and Serafeim (2014) argue that publishing integrated reports can influence the firm's value as shareholders are gradually moving towards finding information from integrated reports, which apparently attracts longer-term investors, further boosting management's confidence to implement its strategy. Two conflicting views have been related to the relationship between IR and firm value. A prevalent study by Lee and Yeo (2016) evidenced a positive relationship between IRQ and firm value, stating that high-quality integrated reports reduce investors' costs of obtaining information and alleviate information asymmetry. Barth et al. (2017) propose that higher liquidity and expected future cash flow (FCF) generate a positive relationship between integrated reporting quality (IRQ) and firm valuation in a way that FCF would be higher due to enhanced internal decision-making. Velte (2021) also opined that the higher quality of integrated reports enhances the company's performance and is positively related to the firm's value. Some other studies (Pavlopoulos et al., 2019; Moloi & Iredale, 2020) have also evidenced a positive impact of IR quality on firm value (measured by Tobin's q), while Landau et al. (2020) found a negative link between the two variables. Another completing study is that there exists no relation between IR disclosure and firm value (Wahl, A., Charifzadeh, M., and Diefenbach, F., 2020), whereas Velte (2021) found in his archival study that both the variables are positively related. As discussed previously, Bijlmakers (2018) contended that IR and firm value are not significantly associated, though the qualitative value of earnings reinforces a positive relationship between them. Nurkumalasari et al. (2019) also found that the firm value of Asian companies is not affected by IR. This uncertainty in the IR and firm value relationship creates a knowledge gap.

So far, research related to IR and firm value has been conducted the most in countries like South Africa, Bangladesh, and Malaysia, as well as industries like the European banking industry and a few more. It has been seemingly limited in the Indian context. Soriya and Rastogi (2022) analysed that IR quality is insignificantly related to firm value and positively associated with firm performance. The relationship needs to be validated because of various contradictory results; hence, we introduce the hypothesis:

H1: Integrated Reporting Quality has a significant impact on firm value.

2.2.2 Firm Characteristics

A stream of research is based on firm characteristics that increase the probability of voluntary IR adoption. Firm characteristics like profitability or firm size invariably increase the likelihood of IR adoption (Frias-Aceituno, Rodríguez-Ariza, and García-Sánchez, 2014). Similarly, De Laan, Buitendag, and Fortuin (2017) state that several firm characteristics, such as industry type, size, and profitability, influence IR quality. It was studied by Garcia-Sanchez et al. (2013) that integrated reports had started to be in demand by large companies. Large companies stand a better chance to gain from IR since they have more scrutiny by investors and regulators and hence experience higher increases in valuation from enhanced disclosure (Kansal et al., 2018). Conversely, smaller companies may not have the resources or the pressure from stakeholders to implement good-quality IR, diluting its effect on valuation. Nurkumalasari et al. (2019) studied the fact that organisation complexity (including firm size as a parameter) and external financing do not impact the relationship between IR and firm value. Bavagnoli et al. (2018) highlighted that they were not able to detect a relevant association between IR quality and firm size even though IRQ was found to have a positive relationship with assurance and locational setting of European firms, while Lee and Yeo (2016) suggested that firm size, particularly large firms, moderate the positive relationship between IR and firm valuation. Also, Kumar and Firoz (2022) opined that market analysts and institutional investors are more likely to monitor and react favourably to IR by larger companies. The firm size positively influences the IR disclosure level in Malaysian publicly listed companies (Ghani et al., 2018). The variable firm age is proxied to the company's stability (Vitolla et al,

2020a). Younger Indian firms were found to be more efficient by Gupta and Jaiswal (2022) in using IR to facilitate alignment with sustainability objectives, translating into greater confidence from investors and value by the market. Studies by Radwan and Xiongyuan (2021) identified that younger companies, particularly those in technology and service industries, are more likely to use IR frameworks actively and experience a higher association between IR quality and firm value.

To our knowledge, limited studies exist that test the moderating impact of firm characteristics on the relationship of given variables within Indian companies which have adopted IR voluntarily. With the help of this literature, we formulate the following hypotheses:

H2: Firm size moderates the impact of IR quality on firm value

H3: Firm age moderates the impact of IR quality on firm value.

3. Research Methodology

3.1 Sample

At present, about 80 companies are practising Integrated Reporting in India. The key sample for the study comprises 75 firms registered on the Bombay Stock Exchange. A few companies were eliminated due to the inaccessibility of reports during data collection. Of data. We used Integrated Reports of companies in our panel data analysis for the Financial Year 2019-2022 period. Sources of secondary data employed in the study are (1) integrated reports, (2) annual reports, and (3) the BSE website.. We used ProwessIQ to obtain data to calculate firm value, Leverage, firm size, and firm age. The data to calculate market capitalisation was manually obtained from stock indices of the BSE 500.

3.2 Variable definition and measurement

As depicted in Figure 1 below, we have employed dependent, independent, moderating, and control variables to conduct our analysis.

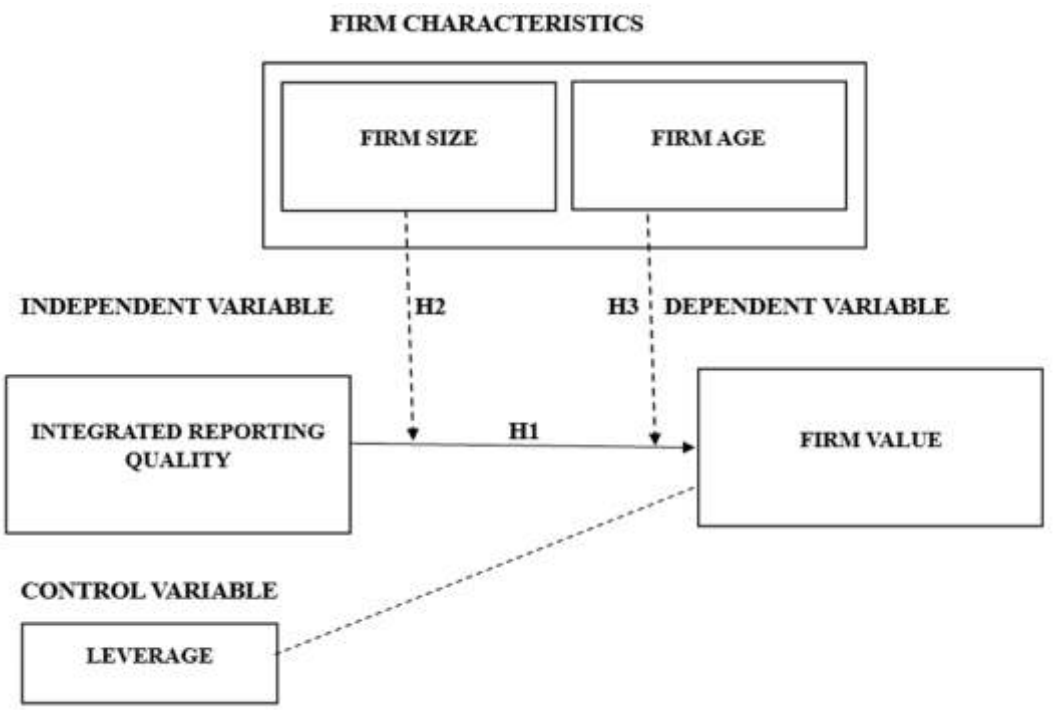

Figure 1. Research Model

3.2.1 Measuring Integrated Reporting Quality

The model has used IR Quality (IRQ) as an independent variable. Prior literature evaluates IR quality using numerous methods (Pistoni et al., 2018; Stent & Dowler, 2015), but most studies employ content analysis.

This methodology refers to the content area of the IR Scoreboard (IRS) proposed by Pistoni et al. (2018). In order to assess IR quality, this scoreboard examines four areas, namely content, background, assurance and reliability, and form, descended from the quality characteristics identified by Hammond and Miles (2004). India has advanced in enacting CSR, being the first nation to enact it as a law in Section 135 of the Companies Act, 2013. The Pistoni Scoreboard, which measures sustainability disclosures on environmental, social, and economic fronts, offers a systematic format for assessing how closely Indian companies meet these requirements. India has seen an increased focus on Environmental, Social, and Governance (ESG) factors, particularly since SEBI's issuance of the Business Responsibility and Sustainability Reporting (BRSR) framework. The Pistoni Scoreboard, assessing non-financial disclosures on sustainability, provides a systematic approach for evaluating the quality and extent of such ESG disclosures as well as the parameter to determine the quality of integrated reports (Pistoni et al., 2018)

'The content should be analysed based on the IIRC framework, which includes eight elements (organisational overview and external environment, business model, outlook, governance, performance, basis of presentation, risks and opportunities, and strategy and resource allocation) and two fundamental concepts (capitals and value creation process).'

These ten elements were judged based on seven guiding principles provided by IIRC. Selecting only the content area is essential because it considers all relevant elements and significant concepts required to measure IR quality. Furthermore, the IRS uses a scoring system which assigns scores ranging from 0 to 5 to each of the 10 elements. A score of 0 is stipulated on the absence of the element, and five is attributed if the element signifies very high quality, making the maximum attainable score 50. Table 1 displays elements of the scoring system of the content analysis. Many other authors have adopted and measured IR quality using IRS (Vitolla et al., 2020b; Zhang et al., 2021).

Data was collected using a manual analysis procedure on 75 companies' reports from 2019-2022. Each integrated report was read, analysed, and scored manually. To avoid subjectivity, an independent researcher was employed to assess and score the reports. He was trained to ensure the dependability of the assessment. An inter-rater check for reliability was accomplished with a satisfactory outcome. Finally, the IR quality score (IRQScore) was obtained by summing up the scores for the evaluated items.

3.2.2 Firm Value

Tobin's Q has been used as a proxy for firm value (Lee & Yeo, 2016; Barth et al., 2017). It is employed as the dependent variable in our study. It is measured as market capitalisation plus the book value of total liabilities divided by total assets. Market Capitalisation was calculated by taking the company's share price on March 31, 2021, and multiplying it with the outstanding shares of that company. The market value contains aspects that are not included in the balance sheet. Girella et al. (2019) contend that IR provides supplementary information, for example, on intellectual and human capital, which is not reflected in asset book value. This makes Tobin's Q a superlative proxy in such a scenario.

Table 1. Scoring system of the Content Area

Score	Description
0	Content element absent
1	Content elements are present, but poor description and scarce reference to the IR guiding principles
2	Content element present; description based on some quantitative information and a few IR guiding principles
3	Content element present; balanced description of contents; average quantity of information that refers to IR guiding principles
4	Content element present; a good and detailed description of contents; many IR guiding principles considered
5	Content element present; excellent description of contents; quite all IR guiding principles used

3.2.3 Firm Characteristics

Firm characteristics have been employed as moderating variables in the study. Two of the characteristics are considered: firm size and firm age. Firm size is calculated as the natural logarithm of the total assets. Firm age represents the steadiness of a firm. It has been computed as the number of years since the company's establishment until the end of 2022. According to Lee and Yeo (2016), firm characteristics, like having a complex firm with high intangible assets, numerous business sectors, and substantial size, strengthen the relationship between the respective variables. They also suggested that a firm with higher external financing needs positively moderates the relationship between IR and firm value.

3.2.4 Leverage

We have used leverage as a control variable in our study. It was calculated as the debt/equity ratio of the companies in the given year. According to Preiato et al. (2015), Leverage significantly impacts firm value, so its impact should be controlled. Various other studies have controlled the effect of leverage on firm value (Ammann, Oesch and Schmid, 2011; Garay & Gonzalez, 2008). It has also been used as a control variable in many studies relating to overall financial performance or while assessing the influence of the ownership structure of a company (Pereira et al., 2023; Sethi, Sahu and Maity, 2023).

3.3 Data Analysis

This section presents models for data analysis. To assess the moderating impact of firm characteristics on the variables, we have used the following cross-sectional regression models:

$$FIRMVAL_{i,t} = \alpha_1 + \beta_1 IRQSCORE_{i,t} + \beta_2 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$FIRMVAL_{i,t} = \alpha_1 + \beta_1 IRQSCORE_{i,t} + \beta_2 FIRMSIZE_{i,t} + \beta_3 IRQSCORE_{i,t} * FIRMSIZE_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$FIRMVAL_{i,t} = \alpha_1 + \beta_1 IRQSCORE_{i,t} + \beta_2 FIRMAGE_{i,t} + \beta_3 IRQSCORE_{i,t} * FIRMAGE_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (3)$$

In the above mentioned equations, subscript *i* and subscript *t* denote the *i*th firm and *t*he period, respectively.

RStudio was used to analyse the above models.

For Model 1, panel linear regression was adopted, simultaneously controlling the effect of Leverage. To rule out the possibility of heteroskedasticity, the Breusch-Pagan Test was employed (Brown & Forsythe, 1974). Hence, we determined that the approximated model is free from heteroskedasticity. Following this, we applied the Durbin-Watson test to identify an autocorrelation problem. The test concluded that the model is free from autocorrelation.

Additionally, regression analysis found that IR Quality impacts firm value. For Model 2 and Model 3, Interaction Analysis was performed. The results concluded that both variables, namely, firm age and firm size, significantly positively affect the association between IR quality and firm value.

4. Empirical Findings

4.1 Descriptive Analysis

Table 2 presents the descriptive statistics of each variable used in the analysis. It shows that the data contains company reports ranging from low to high, with the highest value of 40. Leverage also displays that the data consists of companies that have low levels of debt as well as companies that are highly leveraged. This makes the data to be comprehensive and not only on the extremities. Similarly, it shows that new and old firms are keen on adopting IR. As for all the variables, the skewness lies between -0.5 and 0.5, which indicates that the distribution is somewhat symmetrical and that the variables are likely to correspond to the assumptions of normal distribution. This implies the usage of parametric techniques like Pearson Correlation to provide precise knowledge of the data.

4.2 Bivariate Analysis

The purpose of the Pearson correlation test is to corroborate the assumption of no multicollinearity among independent or explanatory variables in panel data. The test results are presented using a correlation heatmap matrix, which displays the correlation, a bivariate measure, between various variables using a colour-coded matrix, as denoted by Figure 2. It can be seen that firm value (**FirmVal)** is positively and statistically significantly (0.26) correlated with IR Quality (**IRQScore).** Additionally, it can be noted that firm value is also positively and significantly associated with both the interaction terms, i.e. **IRQScore*FirmSize (0.16) and IRQScore*FirmAge (0.23).** Furthermore, the intercorrelation among independent variables lies between -0.24 and 0.24, whereas it goes as high as 0.91 for interaction terms.

Table 2. Descriptive Statistics

Variables Name	No. of observations	Mean	Median	Standard Deviation	Minimum	Maximum	Skewness
IRQScore	225	28.70	28.67	6.84	16	40	0.01
FirmVal	225	4.03	3.77	2.00	0.08	25.86	0.39
FirmSize	225	11.46	11.10	2.36	7.1	30.49	0.45
Leverage	225	1.53	1.22	1.88	0.00	11.75	0.49
FirmAge	225	45.32	44.84	4.59	2.00	120	0.31

Source: Authors' calculation

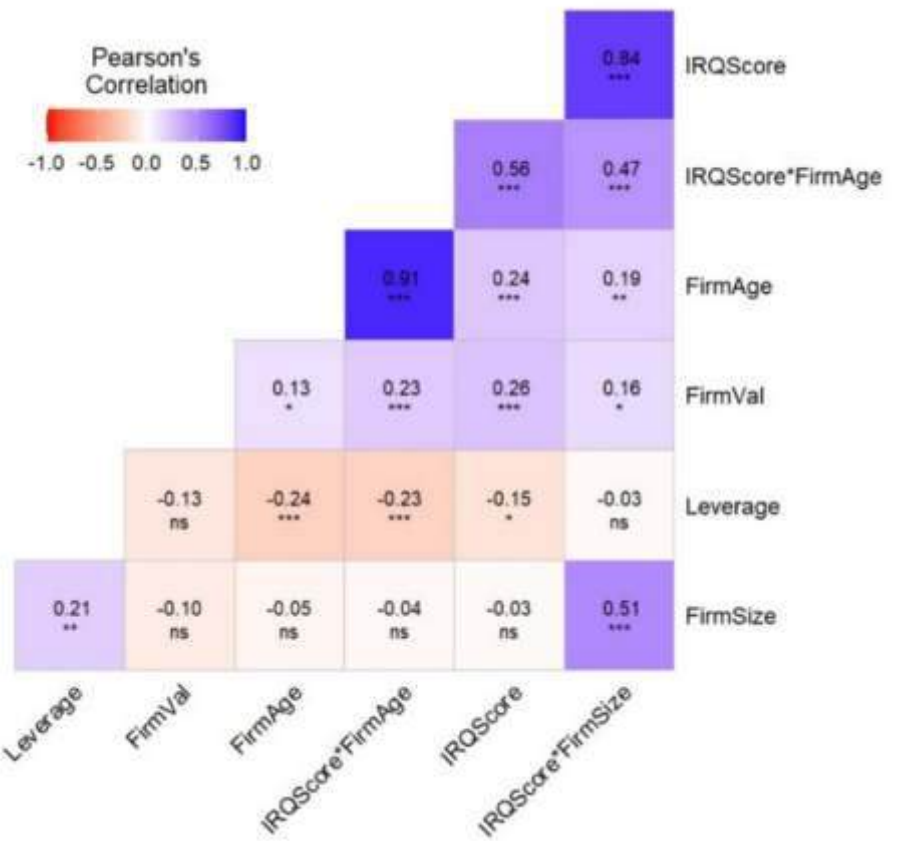

Figure 2. Heatmap Matrix

Table 3. Variance Inflation Factor and Tolerance Level

Variables	VIF	Tolerance
IRQScore	1.11	0.90
Leverage	1.13	0.88
FirmSize	1.06	0.94
FirmAge	1.19	0.84
IRQScore*FirmSize	1.07	0.93
IRQScore*FirmAge	1.07	0.93
Mean VIF	1.10	

Source: Authors' calculations

Multicollinearity is expected to be "harmful" when the correlation coefficient between two independent variables goes beyond 0.8 (Gujarati & Porter, 2009). In our analysis, coefficient values of explanatory variables are below the cut-off point, which can conclude the absence of multicollinearity in data. Multicollinearity diagnostic tests of variance inflation factor (VIF) and tolerance have been employed to verify this statistically. As a thumb rule, VIF greater than 2.5 points summons collinearity problems (Johnston, Jones and Manley, 2018). Since the analysis includes interaction terms, which tend to create higher values of VIF, creating structural multicollinearity, we followed the method of centring independent variables and using standardised values in the calculation (Robinson & Schumacker, 2009).

As shown by Table 3, VIF ranges from 1.06 to 1.19 with a mean of 1.10 and tolerance values vary from 0.84 to 0.94, which, as indicated by Menard (1995), are above 0.20. Otherwise, there could be a cause for concern. He also stated that tolerance values less than 0.10 indicate severe multicollinearity in data. Given the above argument, it can be concluded that there is no multicollinearity among independent variables in our study.

4.3 Multivariate Analysis

After conducting a bivariate analysis, we carried out a multivariate analysis. In this concern, the methodological tools were used to warrant the substantiation of our study's hypotheses by approximating the panel regression models. Nandy (2020) and Goel (2021) used panel data to study the impact of specific characteristics on financial performance. Previous studies have argued that endogeneity is a serious problem in corporate finance research (Larcker & Rusticus, 2007; Wintoki, Linck, and Netter, 2012). As seen in prior studies, a possible way to avoid the endogeneity problem is to inculcate control variables in studies. Another alternative to address this problem is to apply the fixed effects technique (Bauer, 2002; Tsai, 2010) in panel data. To choose between the pooled OLS model and the fixed effects model, the appropriate econometric test (pFtest) was employed, which concluded the validity of the fixed effects model over OLS for all three models of the study. This reduced the possibility of endogeneity in the study, and including Leverage as a

Table 4. Results of one-way fixed effects model

	Model 1				Model2				Model3			
Variable name	Coeff.	Std. Error	t-value	r>|t|	Coeff.	Std. Error	t-value	r>|t|	Coeff.	Std. Error	t-value	r>|t|
IRQScore	1.043	0.230	4.531	0.000***	1.552	0.321	4.834	0.000***	1.698	0.461	3.682	0.000***
Leverage	0.0925	0.166	0.555	0.579	0.125	0.166	0.753	0.452	0.054	0.167	0.323	0.747
Size					1.271	0.625	2.034	0.043*				
IRQScore*Size					0.043	0.019	2.182	0.030*				
Age									0.551	0.337	1.632	0.104
IRQScore*Age									0.016	0.007	2.236	0.026*
R^2	0.131				0.160				0.160			
F-stat	11.176				6.978				6.974			
Prob. (F-stat)	0.000				0.000				0.000			

p-value < 0 '*' < 0.001 '**' < 0.01 '*'**

Sourc.: Authors' calculations

control variable further decreased its probability of existence. Several prior studies have also established the superiority of the fixed effects model over OLS in panel data while measuring IR (Bektur & Arzova, 2022; Mans-Kemp & Van der Lugt, 2020). The Hausman test was used to determine whether a fixed or random effects regression model was most appropriate for the corresponding regression analyses. We concluded that a fixed effects model is most suitable ($p<0.05$) for the study, as also evidenced by prior studies for IR using panel data.

As for Model 1, IR quality positively and significantly impacts firm value while controlling for Leverage, with R^2 of 13.1%, as evidenced in Table 4. Hence, the null hypothesis for H1 is rejected. Models 2 and 3 also give an R^2 value of 16%, and the probability of F-stat ($p<0.000$) indicates the suitability of the models to be used. A one-way fixed effect model was initially used to perform the analysis (Table 5), which captures any unobserved effects that are different across individuals but fixed across time. It was established through Models 2 and 3 that firm characteristics moderate the said relationship. Hence, the null hypothesis for H2 and H3 are also rejected. This is also corroborated by the research done by Kansal et al. (2018), which proves that larger companies generally have more capital to spend on advanced reporting infrastructure and sustainability programs, which results in higher-quality and more credible IR disclosures. Increased visibility and greater stakeholder expectations force larger companies to report more extensively, thus making their IR more effective.

The statistics principles require the respective model to be analysed to check for individual and time effects for panel data. The Lagrange Multiplier Test for balanced panel data was used to test for the "two-ways" fixed effect model, and the results rejected the null hypothesis, concluding that all three models are significant for individual and time effects ($p< 2.2e^{-16}$). After including both individual and time-specific effects, the fixed effect regression models can be re-written as:

$$FIRMVAL_{i,t} = \alpha_1 + \mu_i + \lambda_t + \beta_1 IRQSCORE_{i,t} + \beta_2 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$FIRMVAL_{i,t} = \alpha_1 + \mu_i + \lambda_t + \beta_1 IRQSCORE_{i,t} + \beta_2 FIRMSIZE_{i,t} + \beta_3 IRQSCORE_{i,t} * FIRMSIZE_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$FIRMVAL_{i,t} = \alpha_1 + \mu_i + \lambda_t + \beta_1 IRQSCORE_{i,t} + \beta_2 FIRMAGE_{i,t} + \beta_3 IRQSCORE_{i,t} * FIRMAGE_{i,t} + \beta_4 LEVERAGE_{i,t} + \varepsilon_{i,t} \quad (3)$$

where,

$\mu_i = individual\ effect, \quad \mu_i \neq 0$

$\lambda_t = time - specific\ effect, \quad \lambda_t \neq 0$

Table 5. Results of the two-way fixed effects model

	Model 1				Model2				Model3			
Variable name	Coeff.	Std. Error	t-value	r>|t|	Coeff.	Std. Error	t-value	r>|t|	Coeff.	Std. Error	t-value	r>|t|
IRQSCORE	0.915	0.331	2.762	0.006**	1.407	0.393	3.574	0.000***	1.620	0.457	3.540	0.000***
Leverage	0.131	0.168	0.779	0.437	0.160	0.167	0.954	0.341	0.099	0.167	0.597	0.551
Size					1.307	0.621	2.103	0.037*				
IRQSCORE *Size					0.043	0.019	2.225	0.027*				
Age									0.651	0.337	1.432	0.072
IRQSCORE *Age									0.015	0.007	2.201	0.029*
R^2	0.141				0.158				0.143			
F-stat	11.763				5.399				5.455			
Prob. (F-stat)	0.000				0.010				0.005			
DW	2.21				2.18				2.21			
p-value < 0 '*' < 0.001 '**' < 0.01 '*'**												

Source: Authors' calculations

The models were tested using two-way fixed effect regression analysis, as given in Table 5. It can be noted that R^2 of Models 2 and 3 decreased minimally after including both effects in the study, and models continued to be significant, as indicated by the F-statistic. It is often proved that standard errors in panel data models are biased because of serial correlation, which makes the results less credible. Hence, the need to identify it in idiosyncratic error terms arises (Drukker, 2003) and calls for the appropriate test to detect autocorrelation. The most widely used test for this is the Durbin-Watson test. Our analysis revealed the absence of autocorrelation/serial correlation in error terms ($p>0.05$), as indicated by the Durbin-Watson value of near and above 2.

Heteroscedasticity is also reported to be a common problem in panel data models, and it is appropriate to focus on making robust standard errors to address this problem (Saeed et al., 2018). The Breusch-Pagan test (Brown & Forsythe, 1974) indicated that Models 1 and 2 are free from heteroscedasticity, but Model 2 rejected the null hypothesis only to conclude the presence of heteroscedasticity. The problem was controlled by making robust standard errors and running a two-way fixed effect model of panel data simultaneously, as presented in Table 6. The residual plot of each model has already been studied, and the residual plot is null. Hence, there is no problem of non-linearity.

After performing the analysis, IR quality impacts a firm's value over the years, and the firm's characteristics also moderate the relationship between both variables. The positive and significant moderation by firm size and age is diagrammatically represented through interaction analysis (figures 3 and 4). Interaction analysis helps researchers evaluate patterns beyond their awareness at the time of their occurrence.

Table 6. Robust standard error for Model 2

	Model 2			
Variable name	Coeff.	Robust Std. Error	t-value	r>|t|
IRQSCORE	1.552	0.458	3.386	0.000*
Leverage	0.125	0.183	0.683	0.495
Size	1.271	0.883	1.438	0.152
IRQSCORE*Size	0.430	0.029	1.486	0.039*

Source: Authors' calculations

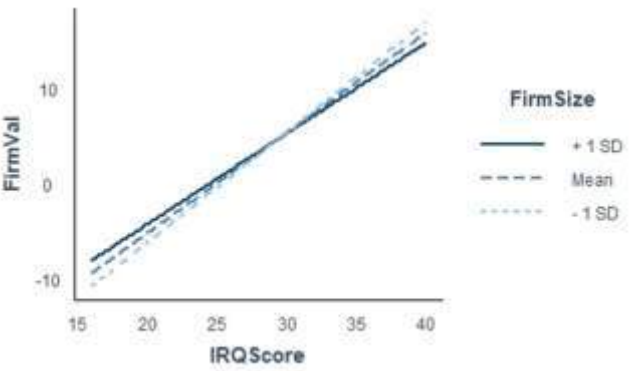

Figure 3. Interaction Analysis of Firm Size

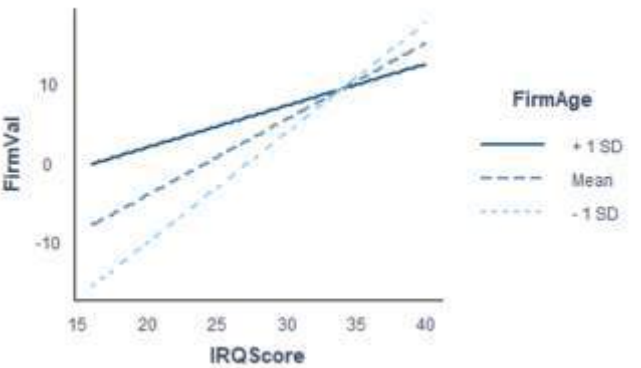

Figure 4. Interaction Analysis of Firm Age

5. Discussion and Conclusion

Agency theory has assisted in analysing the effect of IR quality on firm value. Using the signalling theory, the research precisely tested the moderating effect of firm size and firm age on the relationship between IR quality and firm value. We used IR quality (IRQ) and firm value as our primary variables to perform the evaluation. The paper also inspected if firm characteristics moderated the relationship among our dependent (firm value) and independent (IR quality) variables for all companies, as we expect that providing valuable information to stakeholders through integrated reports can help overcome the problem of information asymmetry and enhance a company's market growth.

The regression results show that IR Quality has a positive and significant impact on the firm value of Indian-listed companies. The result of substantial impact is corroborated by Lee and Yeo (2016). Other studies substantiate the vital relationship between both variables (Barth et al., 2017;

Islam, 2021; Samy & Deeb, 2019). However, the moderating analysis of a firm's characteristics on the relationship between IR quality and firm value reveals that a firm's size and age reinforce the positive relationship between both variables. This signifies that a firm's ability (signalled by logarithmic expression of total assets) and its stability (expressed by firm age) can affirmatively enhance firm value, thereby increasing its market growth as increased company value is a sign of market growth. These findings have also been validated by Lee and Yeo (2016).

5.1 Managerial Implications

The study contributes, in many ways, to elevating existing literature. It expands the scope of agency and signalling theory underutilised in renditioning IR-related phenomena. Hence, the study outcomes have significance for practitioners, more specifically, corporate administrators and governance bodies, as the IR process is still penetrating its roots into the reporting grounds of Indian companies. The results supplement the motivation for identifying firm characteristics to strengthen the dependent-independent variable relationship. Thus, companies are encouraged to look at their assets, which makes a proxy for firm size, reinforcing the significance of the said relationship and further enhancing the firm value.

Furthermore, the results lay a foundation of essential information for policymakers. The firm characteristics positively affect the said relationship. It has been reported that the companies that started undertaking IR earlier than others have better valuation metrics. So, investors can look forward to investing in these companies. This paper motivates managers to produce high-quality integrated reports as they positively influence the firm's value, which could result in the company moving in a more profitable direction. The paper also offers significant insights for investors motivated to invest in companies that publish integrated reports. Since IR is practised voluntarily in India, the positive results of the research could equip policymakers to take steps towards making this phenomenon obligatory.

5.2 Limitations and Future Research

This research can be recognised as an imperative cause for assessing the capability of IR quality of Indian companies and understanding its contribution concerning firm value in a voluntary setting. However, the study suffers a few limitations. First, a fascinating approach would be adding more firm characteristics as moderating variables, as our research has considered only two factors. Researchers might also consider board and firm characteristics (Vitolla, Raimo and Rubino, 2020a). Secondly, our study faced data limitations as the phenomenon of making integrated reports has recently been introduced in India, too voluntarily. Moreover, the study concentrates on the reports' quality and does not explicitly disclose elements, which provides a promising avenue for future research. A further limitation is associated with methodology. However, this limitation may characterise an essential basis for further research. Researchers can change the method for measuring IR quality by considering all four quality attributes defined by Hammond and Miles (2004). Future researchers can consider developing new quality measures or updating the existing ones. Finally, the researchers may test the validity of firm characteristics as a moderating variable by expanding the horizon of the dependent variable, that is, replacing the firm value with the firm performance of Indian companies as it includes a company's operational and financial performance and not only market growth. Hafiz et al. (2021) also contend that the research related to the development of a firm still stands incomplete. The study can further be strengthened by adding more control variables and demographic factors. Further, deviation of the model concerning structural changes could also be explored.

Given that IR is a recently developed system, investors can use it as a tool to measure companies' significance. Research can be furthered as this area promises a broader scope from both investors' and companies' points of view.

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Examining the Role of Family in Shaping Financial Behaviour: A Higher-Order Moderated-Mediation Approach

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Abstract

This study, grounded in the theory of family financial socialisation, aims to empirically investigate the influence of financial socialisation within the family on financial behaviour. Data from 385 valid responses were collected using convenience sampling through structured questionnaires from university students in Punjab, India, and analysed using SmartPLS v. 4.0.9.2. Simple slope analysis was performed to assess the interaction effect of financial self-efficacy on the serial mediation model. The results indicate a significant positive relationship between family financial socialisation, financial education, financial attitude and financial behaviour. The association between family financial socialisation and financial behaviour is serially mediated by financial education and financial attitude. The current study focuses solely on university students in Punjab, thereby limiting the generalizability of the findings. The study supports educational institutions and policymakers in designing capacity-building courses that help youth navigate various pathways to sustainable livelihoods as adults.

Keywords: *Family financial socialisation, financial behaviour, undergraduate students, structural equation modelling, mediation analysis, Punjab*

1. Introduction

Growing worries about the global economy and the rising inclination towards consumerism have sparked a rising curiosity among educators, politicians, and families in promoting better financial behaviour. According to recent research conducted by Mint, 50% of Indian consumers – led by Gen Z – are currently prioritising immediate spending above long-term financial planning. Early adulthood is a crucial juncture at which one's financial attitudes and behaviours are shaped and influence one's lifetime (Pak et al., 2023). To instill financial discipline from an early age, it is essential to educate individuals, particularly children, on the concepts of financial planning, budgeting, and saving. Within this complex terrain of financial decision-making, the family plays a pivotal role as the primary arena for the acquisition of financial attitudes, encompassing both emotional and cognitive responses to financial matters, and financial behaviors, which involve the actions taken regarding money management—the outcomes encapsulated by the term "family financial socialisation" (Joo & Grable, 2004; Shim et al., 2009). Parental financial behaviours, communication patterns, and socio-economic context are identified as potential influencers, each playing a unique role in shaping the financial dynamics within families (Hira & Loibl, 2005; Morgan et al., 2019; Perry & Morris, 2005).

Clear and regular financial communication and direct instructions from parents are considered crucial factors in developing better financial management knowledge and skills among young adults (Allen, 2008; Jorgensen & Savla, 2010; Lebaron et al., 2018; Danes, 1994). Youngsters view parents as the most crucial influence on financial socialisation (Côté, 2002). Socialisation, in general terms, refers to the process by which parents, either directly or indirectly, help adolescents acquire the values, standards, and behaviours necessary for success within their cultural environment (Parke & Buriel, 2006; Danes, 1994). A significant amount of socialisation occurs through regular activities and daily life patterns (Allen et al., 2007). Children acquire knowledge of financial behaviour by observing and imitating their parents' actions in daily life activities such as mortgage payments, grocery shopping, and credit card management. They also learn from their parents' responses to financial difficulties, such as job loss or housing problems (Li et al., 2021). It signifies that the youngsters gain their basic financial knowledge from their parents. As children transition into adulthood, they begin to acquire the skills necessary to handle their financial matters, such as managing their bank accounts by keeping track of monthly payments, repaying student loans, and effectively managing credit card debt (Chowa & Despard, 2014; Pinto et al., 2005). Young adults modify the financial information they gained from early parental financial socialisation and construct their financial plans based on their present financial situations, thus shaping their financial attitude (Gutter & Copur, 2011; Danes & Yang, 2014). The goal of the current study is, therefore, to explore the role of parental financial socialisation in the financial outcomes experienced by young university students.

The financial behaviour, well-being, and socialisation of young individuals have been specifically studied among white college students in the United States (Danes, 1994; Hibbert et al., 2004; Lyons, 2004; Moschis, 1985; Pinto et al., 2005; Serido et al., 2010; Gutter & Copur, 2011; Jorgensen & Savla, 2010; Li et al., 2021; Pak et al., 2023). However, there is a scarcity of research that explicitly examined the financial behaviour of university students in Indian settings, particularly in the context of culturally diverse states in India (Bapat, 2020; Das, 2016). It is essential to study the financial behaviour of Indian university students, as indicated by the NFSE-FLIS (2019), which reveals that just 27% of Indians possess financial literacy. Furthermore, among this group, 30% are those aged 18-29 years. Furthermore, 43% of them consist of individuals who are either now pursuing or have already completed a university education. Additionally, the survey indicated that the northern region of India had the second-largest proportion of financially literate individuals in the country (NFSE-FLIS, 2019). This research aims to investigate the financial behaviour of university students in Punjab, a region situated in northern India.

This research makes a significant contribution to the current understanding of family financial dynamics and the financial behaviour of young adults. First, the adoption of a higher-order moderated-mediation approach represents a methodological advancement, offering a more comprehensive understanding of the intricate relationships between family financial socialisation and financial behaviour. Second, it supports educational institutions in designing tailor-made content and pedagogy for financial curricula based on the capabilities of young people, aiming to provide better financial education and fill existing gaps in the financial socialisation of young children. Policymakers can utilise the findings of this study to create capacity-building programs that assist youth in navigating different pathways to achieving sustainable livelihoods as adults.

2. Literature Review

2.1 Theoretical Grounding

The research is based on the family financial theory proposed by Gudmunson and Danes (2011), which incorporates individual and family appearances influencing family dynamics and interactions, as well as financial education. The idea suggests that financial attitudes, knowledge, and skills are influenced by familial processes and socialisation, which shape the individuals' financial behaviour and well-being. Financial attitudes, knowledge, and abilities serve as intermediaries between the financial socialisation process and its outcomes (Kim & Torquati, 2020). Gudmunson and Danes (2011) emphasize the significance of the parent-child relationship within this framework, highlighting the influential role of family members in the socialisation process. Adults also inherit financial habits from their parents (Shim et al., 2015; Zhu, 2019). The theory underscores the importance of both intra-family interactions and familial roles (Rea et al., 2019). According to the family financial socialisation model, children acquire money-related norms and knowledge from their families, with parents transmitting socially appropriate financial behaviours in observable social contexts (Jurgenson, 2019). Implicit learning through parental observation and explicit learning through direct parental instruction are key components of financial socialisation before students reach university (Sirsch et al., 2020).

2.2 Financial Behaviour

Financial management behaviour, according to Kholilah and Iramani (2013), is the capacity to manage the planning, budgeting, checking, managing, regulating, seeking, and storing of daily financial money. Sabri et al. (2023) explored the impact of financial behaviour on financial well-being among young Malaysians during the COVID-19 pandemic. The study, which involved 360 participants, used structural equation modelling to reveal that financial behaviour mediates the relationships between financial literacy, financial socialisation, self-control, financial technology, and financial well-being. The findings highlighted the critical role of financial behaviour in enhancing young adults' financial well-being and offered insights for developing targeted outreach programs. Zupancic and Lep (2024) found in their 482 student-parent pairs study that proactive financial behaviour and positive parent-child financial relationships significantly improve students' financial knowledge, which further enhances parent-child financial dynamics. These results highlighted the benefits of adequate financial socialisation for both parents and their emerging adult children.

2.3 Family Financial Socialisation

Ward (1974) laid the groundwork for understanding family financial socialisation by introducing the concept of consumer socialisation, defining it as the process that influences current and immediate behaviour. Kim and Torquati (2020) expanded on this, stating that financial socialisation does not just prepare individuals for marketplace interactions but also encompasses acquiring values, attitudes, norms, and knowledge crucial for financial stability and personal well-being. Jorgensen et al. (2016) conducted a study aimed at assessing the conceptual model of perceived parental encouragement on financial knowledge, attitudes, and behaviour. Drawing on the family resource management theory and social learning theory as theoretical foundations, the study posits that there is an insignificant correlation between parental influence and financial knowledge, primarily because many parents do not directly instruct their children on financial matters. Various authors studied different domains of family financial socialisation i.e. parental financial communication (Shim et al., 2015; Zhu, 2018), parental financial norms (Shim et al., 2010; Watson & Barber, 2017), parental financial role modeling (Li et al., 2021), and financial relationship with parents (Kirkpatrick Johnson, 2013). Pandey and Utkarsh (2023) found that "attitude toward money" and financial literacy mediate the relationship between financial socialisation and financial behaviour in young adults. Their study suggested that promoting financial literacy, budgeting habits, and early personal wealth management education are crucial. Additionally, parental involvement plays a key role in fostering positive financial behaviour. For instance, Mahapatra et al. (2024) in a study examining the impact of parental financial socialisation on college students' life satisfaction in India found that direct parental teaching positively influences desirable financial behavior, which in turn enhances life satisfaction that highlighted the significance of family financial socialisation and the varying effects of parents' socio-economic characteristics on financial outcomes and life satisfaction. The present study implemented three major domains of family financial socialisation (i.e., financial education, financial attitude, and financial behaviour) to cover each aspect of the construct. Hence, based on the previous studies, the following hypotheses are formulated:

H1(a). Family financial socialisation has a significant direct influence on financial education.

H1(b). Family financial socialisation has a significant direct influence on financial attitude.

H1(c). Family financial socialisation has a significant direct impact on financial behaviour.

2.4 Financial Education

In India, various financial education programs are provided by NCFE (2014), whose vision is to create a financially aware and empowered India. A global survey by Streak (2021) conducted a quiz that garnered more than 3,000 sign-ups from over 100 schools across the country, targeting individuals aged 11 to 17 years. The quiz tested the school students on topics like banking products, currency, personal finance, payment systems, credit and loans, and investment and found that the financial literacy rate of adults in India is 27 per cent, which is lower when compared to countries like the United Kingdom (67 %), Singapore (59 %), and the US (57 %). Zhu (2019) suggested that school financial education is critical during the adolescent stage, as it helps build confidence in making financial decisions. According to Jian and Joyce (2010), young adults who receive formal financial education in school, as well as informal financial education at the workplace, have a better chance of acquiring broad and practical financial knowledge, as well as self-confidence in their ability to make financial decisions. Young adults' financial attitudes are influenced by both classroom and self-learning (Shim et al., 2015). Hence, based on previous literature, the following hypotheses are formulated:

H2(a). Financial education has a direct and significant influence on financial attitudes.

H2(b). Financial education has a direct and significant influence on financial behaviour.

2.5 Financial Attitude

Financial attitude, as defined by Radianto (2020), refers to one's way that influences how one manages his/her money. Siswanti and Halida (2020) concluded that financial attitude and knowledge significantly influence financial behaviour. Similar studies also found that financial attitude significantly impacts an individual's financial behaviour (Huston, 2010; OECD/INFE, 2012; Potrich et al., 2016; Serido et al., 2015). Financial attitudes have a positive association with an individual's financial behaviour (Herdjiono & Damanik, 2016; Potrich et al., 2016; Tang & Baker, 2016). Radianto (2020) asserts that a higher financial attitude leads to greater behavioural change, indicating that one's ability to manage money improves when there is a positive attitude towards financial behaviour. Ameliawati and Setiyani (2018) in their study revealed that the financial attitude has a direct influence of 0.522 on financial management behaviour. This means that a one-unit increase in financial attitude will result in a 0.522-unit increase in financial management behaviour, given that financial socialisation, experience, and literacy remain constant. Furthermore, a positive financial attitude plays a significant role in determining whether financial aspects succeed or fail, as it influences positive behaviour. Hence, based on the above discussion, the following hypothesis is proposed:

H3. Financial attitude has a direct and significant influence on financial behaviour.

2.6 Financial Education as a Mediator

Financial education, which can be segmented into classroom learning and self-learning, contributes significantly to an individual's ability to manage financial resources effectively and create informed financial decisions (Lusardi, 2019; Urban et al., 2020). Classroom learning provides structured and formal financial knowledge, enabling individuals to understand and manage their finances effectively (Mitchell & Lusardi, 2014). Self-learning, through personal efforts and the use of various educational resources, allows individuals to tailor their financial knowledge to their specific needs and contexts, fostering a deeper and more practical understanding of financial management (Atkinson & Messy, 2012). The integration of financial education, facilitated through both classroom instruction and self-learning, can enhance the financial behaviours shaped by early family financial socialisation, thereby bridging the gap between learned financial concepts and actual financial practices (Clarke et al., 2005; Xiao & O'Neill, 2016). This suggests that financial education directly impacts financial behaviour, and strengthens parental financial socialisation, resulting in more competent and responsible adult financial decision-making. A study by Carpena and Zia (2020) found a significant mediating effect of financial education on the relationship between general financial awareness and personal financial outcomes. Thus, on the basis of the above discussion, it is hypothesised that-

H4(a). Financial education significantly mediates the relationship between family financial socialisation and financial behaviour.

H4(b). Financial education significantly mediates the relationship between family financial socialisation and financial attitude.

2.7 Financial Attitude as a Mediator

Various research extensively documented the pivotal role played by financial attitude as a mediator in various financial contexts. For instance, Çoskun and Dalziel (2020) found that financial attitude significantly mediates the relationship between financial literacy and financial behaviour, indicating that individuals with a positive financial attitude are more likely to apply their financial knowledge effectively, resulting in improved financial outcomes. Similarly, Shim et al. (2010) demonstrated that financial attitudes mediated the relationship between financial socialisation and financial practices among young adults, suggesting that financial education, when coupled with a positive financial attitude, leads to better financial behaviour. Also, Serido et al. (2013) found that the quality of financial relationships with parents is predictive of financial behaviours, with financial attitudes serving as a crucial mediating factor. These findings collectively suggest that financial education alone may not be sufficient to enhance financial behaviour unless it positively shapes individuals' financial attitudes. Therefore, it is hypothesised that:

H5(a). Financial attitude significantly mediates the relationship between family financial socialisation and financial behaviour.

H5(b). Financial attitude significantly mediates the relationship between financial education and financial behaviour.

2.8 Serial Mediation of Financial Education and Financial Attitude

Previous literature has consistently shown that family financial socialisation plays a crucial role in shaping an individual's financial attitudes and behaviours (Gudmunson & Danes, 2011). Specifically, parental communication about finances and active financial role-modelling has been shown to instill positive financial attitudes in children, which subsequently influence their financial behaviours (Shim et al., 2010). Additionally, the quality of the financial relationship with parents significantly contributes to the formation of these attitudes (Jorgensen & Savla, 2010).

Financial education, particularly through classroom learning and self-learning, further mediates this relationship by providing structured knowledge and skills that reinforce the financial attitudes formed through family socialisation (Tang & Baker, 2016). Classroom learning offers formal education and a comprehensive understanding of financial concepts, while self-learning, driven by individual motivation, allows for the practical application and deeper internalisation of these concepts (Lusardi & Mitchell, 2013). There is a dearth of literature studying the serial mediating effect of financial education and financial attitude on the relationship between family financial socialisation and financial behaviour. Based on the above discussion, it is hypothesised that:

H6. Financial education and financial attitude serially mediate the relationship between family financial socialisation and financial behaviour.

2.9 Financial Self-efficacy as a Moderator

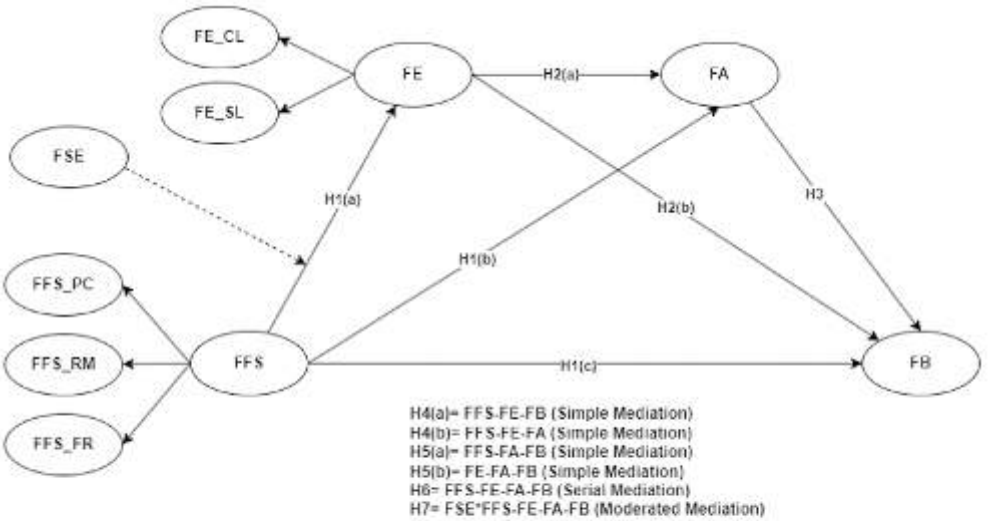
The idea of financial self-efficacy was developed by Albert Bandura. Self-efficacy is actually an individual's sense of confidence in their ability to perform a certain skill or task to obtain specific outcomes (Bandura, 1977). Various studies have investigated the moderating function of financial self-efficacy in the relationship between financial literacy and financial behaviour (Mubarik et al., 2020; Qamar et al., 2016). To the authors' knowledge, no studies have shown the moderating effect of financial self-efficacy on the relationship between family financial socialisation and financial education.

As determined by Mubarik et al. (2020), individuals with a high level of financial self-efficacy have high control over financial situations compared to those with less financial self-efficacy. According to the cognitive social theory, those with better financial self-efficacy are more involved in the face of hardship, and vice versa. Another study by Lim et al. (2014) highlighted that financial self-efficacy can be improved by providing financial education on campus that ultimately enhances financial well-being. In the present study, the researchers seek to find whether financial self-efficacy moderates the indirect relationship between family financial socialisation and financial behaviour mediated by financial education and financial attitude. In line with the above-stated discussion, the following hypothesis is proposed:

H7. Financial self-efficacy significantly moderates the relationship between family financial socialisation and financial behaviour mediated serially by financial education and financial attitude.

3. Conceptual Model

As per the literature and hypotheses indicated above, the proposed conceptual model of the study is shown in Figure 1.



Note(s): *FFS = Family Financial Socialisation, FE = Financial Education, FA = Financial Attitude, FB = Financial Behaviour, FFS_PC = Parental Communication, FFS_RM = Parental Financial Role Modelling, FFS_FR = Financial Relationship with Parents, FE_CL = Classroom Learning, FE_SL = Self-Learning, FSE = Financial Self-efficacy.*

Source: Authors' own work

Figure 1. Proposed Conceptual Model

4. Research Methodology

4.1 Sampling and Data Collection

A survey instrument was distributed to the university students of Punjab in the fields of commerce, management, and economics. The data was collected through face-to-face interviews with the respondents from January to March 2024. A sample of 650 students was recruited and invited to participate in the survey using convenience sampling methodology, out of which 411 were returned, indicating a response rate of 63%. Further, during the data cleaning process, 26 responses were eliminated due to incompleteness, leaving a final sample of 385 valid responses that were ultimately retained. The G*power software v. 3.1.9.6 recommended 134 minimum sample size using an a priori sample size calculator with a medium effect size of 0.3, a = 0.05, and power = 0.80 (Erdfelder et al., 1996). Thus, the sample size for the study was considered satisfactory as per the need of the study.

4.2 Data Characteristics

The study's sample consisted of 149 male and 246 female university students from Punjab state of India who gave their informed consent before filling out the survey (**Table 1**). The majority of the students (48.35%) belonged to the 26-30 age group. Moreover, the maximum number of respondents had post-graduate degrees (53.42%) and were single (63.04%). Participants who belonged to the nuclear family accounted for 56.71% while 43.29% belonged to the joint family. It is noteworthy that more than half of the respondents (58.23%) were financially dependent on their parents or guardians. Approximately 53% of the male and female participants reported a total monthly household income of less than Rs. 40,000.

Table 1. Demographic characteristics of respondents (*n*=385)

Characteristics	Categories	*n*	*(%)*
Gender	Male	149	37.72
	Female	246	62.28
Age (in years)	21-25	114	28.86
	26-30	191	48.35
	31-35	90	22.78
Marital Status	Married	146	36.96
	Unmarried	249	63.04
Qualification	Graduation	115	29.11
	Post-graduation	211	53.42
	Ph.D.	69	17.47
Family Structure	Joint	171	43.29
	Nuclear	224	56.71
Financially Independent	Yes	165	41.77
	No	230	58.23
Household monthly income (in *INR*)	less than 20,000	101	25.57
	20,000-40,000	112	28.35
	40,000-60,000	81	20.51
	60,000-80,000	44	11.14
	more than 80,000	57	14.43

Source(s): *Table by authors*

4.3 Survey Instrument

All the variables in the study were assessed through a survey using the modified version of the scales developed by various researchers in the literature. The participants responded on a five-point Likert scale ranging from *strongly disagree (1)* to *strongly agree (5)*.

4.3.1 Family Financial Socialisation

Family financial socialisation (FFS), having three dimensions: parental communication, parental financial role modelling, and financial relationship with parents, was measured using the scale proposed by Shim et al. (2010). The parental communication (FFS_PC) was assessed using six items such as "My parents discuss family financial matters with me" (M = 3.507, SD = 1.374, α =0.808), the parental financial role modeling was assessed using the four items such as "I make financial decisions based on what my parent(s) have done in similar situations" (M = 2.568, SD = 0.896, α = 0.902) and the financial relationship with parents was assessed using the three items such as "My parents with parents is not good because of money issues" (M = 3.00, SD = 1.618, α = 0.785).

4.3.2 Financial education

In order to measure the respondents' financial education (FE), two dimensions, namely classroom learning and self-learning, were utilised. Two-item classroom learning scale (FE_CL) adapted from Shim et al. (2015) and four-item self-learning scale (FE_SL) adapted from Cao et al. (2020) and Mountain et al. (2021) were used. The classroom learning was assessed using five-point likert scale ranging from *Never (1)* to *Always (5),* items such as "Attended personal finance classes/workshops while in high school" (M = 3.190, SD = 1.382, α = 0.675), while the self-learning was assessed using items such as "I like to read books or magazines on personal finance or investment" (M = 3.730, SD = 1.289, α = 0.854).

4.3.3 Financial attitude

The financial attitude (FA) of the students was assessed using a nine-item scale developed by Shockey (2002). The scale consisted of items such as "It is important to establish financial targets for the future" (M = 3.720, SD = 1.234, α = 0.826).

4.3.4 Financial behaviour

The study measured the financial behaviour (FB) of students using a 12-item scale adapted from Dew & Xiao (2011). The scale consisted of items such as "I do comparison shopping when purchasing a product or service" (M = 3.460, SD = 1.276, α = 0.852).

4.3.5 Financial self-efficacy

To measure the students' financial self-efficacy (FSE), the study used the six-item scale given by Lown (2011). The scale consisted of items such as "I am confident about my ability to manage my finances" (M = 3.210, SD = 1.418, α = 0.682).

4.4 Analytical techniques

The present study employed SmartPLS-SEM (Partial least squares structural equation modelling) v. 4.0.9.2 (Ringle et al., 2015). The model of this study included higher order constructs as well as serial mediation and moderated mediation analysis. SmartPLS software provides solutions for complex models, including higher order constructs, which reduces the multicollinearity issues (Chin, 1998; Hair et al., 2018; Ringle et al., 2015). The measurement model was assessed by using a disjoint two-stage approach (Sarstedt et al., 2019). First, the validity and reliability have been examined on lower-order components (FFS_PC, FFS_RM, FFS_FR, FE_CL, FE_SL, FA, FSE, and FB). In stage two, the model used the latent scores of lower-order components obtained in the first stage in the final dataset to assess the validity and reliability of higher-order constructs (FFS and FE) after examining the results in first order.

5. Results

5.1 Common Method Bias and Multicollinearity Test

In order to determine the non-response bias, the researchers contrasted the early respondents with the late respondents, with 50 participants in each group (Armstrong & Overton, 1977). The continuum of resistance model suggests that late respondents can serve as a substitute for non-respondents when estimating the non-response bias (Lin & Scheffer, 1995; Voogt et al., 1998). Using the paired-samples t-test in SPSS, it was determined that there were no statistically significant differences between early respondents and late respondents. In addition, we evaluated the presence of common method bias by employing Harman's single-factor test. This was necessary because our study is based on self-reported data obtained from a single questionnaire (Podsakoff et al., 2003). The initial component recovered explained 38.312% of the overall variation, which was far below the minimum requirement of 50% (Podsakoff et al., 2012). Therefore, the results validate that there was no presence of common technique bias among the constructs. Furthermore, the Variance Inflation Factor (VIF) values for all variables in the inner model were below 3.3. Therefore, it was concluded that the model of this study was free from multicollinearity (Hair et al., 2019).

5.2 First Order Measurement Model Assessment

The indicator reliability specifies which part of an indicator's variance can be explained by the underlying latent variable (Gotz et al., 2010). Some indicators (eg, FFS_PC4, FFS_PC5, FA6, FA7, FSE3, FSE4, FB5, FB6, FB7, FB12) with low factor loadings (<0.50) were deleted as they were considered insignificant (Chin W, 1998; Henseler et al., 2009). In this way, the criterion of item reliability for first-order constructs was supported (Table 2). To examine the internal consistency and reliability, Cronbach's alpha and composite reliability were assessed. All the latent constructs fulfilled the minimum level (i.e., 0.70 and above) for the first-order constructs (Cronbach, 1951; Hair et al., 2014). Further, the AVE value for first-order constructs provided evidence that there was no issue of convergent validity as these were above 0.50 for all the latent constructs (Fornell & Larcker, 1981). Additionally, the discriminant validity was evaluated using the heterotrait-monotrait ratio (HTMT) (Table 3) and the Fornell-Larcker criterion (Table 4). The evaluation of these two criteria collectively indicated the successful establishment of discriminant validity for first-order constructs (Hamid et al., 2017; Fornell & Larcker, 1981; Sarstedt et al., 2019).

Table 2. Measurement Model Results *(first order)*

Construct	Items	Factor loadings	Cronbach's alpha	CR	AVE
Family financial socialisation (FFS)					
Parental communication (FFS_PC)	FFS_PC1	0.870	0.873	0.913	0.725
	FFS_PC2	0.915			
	FFS_PC3	0.792			
	FFS_PC6	0.824			
Parental financial role modeling (FFS_RM)	FFS_RM1	0.885	0.902	0.932	0.773
	FFS_RM2	0.824			
	FFS_RM3	0.932			
	FFS_RM4	0.873			
Financial relationship with parents (FFS_FR)	FFS_FR1	0.852	0.785	0.875	0.702
	FFS_FR2	0.907			
	FFS_FR3	0.746			
Financial education (FE)					
Classroom learning (FE_CL)	FE_CL1	0.862	0.675	0.860	0.754
	FE_CL2	0.875			
Self-learning (FE_SL)	FE_SL1	0.893	0.804	0.873	0.636
	FE_SL2	0.905			
	FE_SL3	0.652			
	FE_SL4	0.710			
Financial attitude (FA)	FA1	0.786	0.906	0.926	0.644
	FA2	0.889			
	FA3	0.698			
	FA4	0.863			
	FA5	0.830			
	FA8	0.770			
	FA9	0.765			
Financial behavior (FB)	FB1	0.778	0.930	0.943	0.674
	FB2	0.870			
	FB3	0.709			
	FB4	0.871			
	FB8	0.853			
	FB9	0.874			
	FB10	0.750			
	FB11	0.844			
Financial self-efficacy (FSE)	FSE1	0.721	0.687	0.809	0.514
	FSE2	0.699			
	FSE5	0.679			
	FSE6	0.767			

Source(s): Table by authors

Table 3. Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT) *(first Order)*

	FA	FB	FE_CL	FE_SL	FFS_FR	FFS_PC	FFS_RM	FSE
FA								
FB	*0.826*							
FE_CL	0.118	*0.148*						
FE_SL	0.677	0.684	*0.233*					
FFS_FR	0.245	0.272	0.231	*0.153*				
FFS_PC	0.688	0.663	0.149	0.628	*0.431*			
FFS_RM	0.700	0.792	0.103	0.631	0.371	*0.843*		
FSE	0.704	0.678	0.206	0.477	0.354	0.474	*0.604*	

Note: Values that meet or exceed the expected level are shown in italics.
Source(s): Table by authors

Table 4. Discriminant Validity - Fornell-Larcker Criterion *(first Order)*

	FA	FB	FE_CL	FE_SL	FFS_FR	FFS_PC	FFS_RM	FSE
FA	*0.802*							
FB	0.765	*0.821*						
FE_CL	0.035	0.051	*0.869*					
FE_SL	0.604	0.614	0.168	*0.798*				
FFS_FR	0.206	0.234	0.172	0.091	*0.838*			
FFS_PC	0.624	0.608	0.082	0.534	0.370	*0.852*		
FFS_RM	0.650	0.740	0.047	0.558	0.317	0.766	*0.879*	
FSE	0.565	0.551	0.135	0.379	0.261	0.381	0.496	*0.717*

Note: Values that meet or exceed the expected level are shown in italics.
Source(s): Table by authors

5.3 Second-order Measurement Model Assessment

To assess the second-order measurement model, it becomes necessary to measure all the latent variables again to check their indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Hence, using the disjoint two-stage approach, the researcher evaluated the measurement model. The criterion of item reliability for second-order constructs had achieved minimum loadings of 0.50 (Henseler et al., 2009) (Table 5). Further, the minimum level of 0.60 and above was observed for Cronbach alpha and composite reliability, thus establishing internal consistency and reliability of the second-order constructs (Hair et al., 2014). The AVE value of second-order constructs indicating the average variance of the indicators was above 0.50 (Fornell & Larcker, 1981), showing satisfactory convergent validity. Further, the assessment of discriminant validity ensured that all HTMT ratios (Table 6) remained below 0.90 (Henseler et al., 2015). Moreover, Fornell and Larcker criterion (Table 7) confirmed that the square root of each construct's AVE exceeded its correlation with other constructs (Fornell & Larcker, 1981; Sarstedt et al., 2019), indicating the successful establishment of discriminant validity for second-order constructs.

Table 5. Measurement model results *(second order)*

Construct	Items	Loadings	Cronbach's alpha	CR	AVE
Family Financial Socialisation (FFS)	FFS_PC	0.925	0.770	0.861	0.683
	FFS_RM	0.926			
	FFS_FR	0.580			
Financial Education (FE)	FE_CL	0.715	0.603	0.819	0.697
	FE_SL	0.940			

Source(s): Table by authors

Table 6. Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT) *(second order)*

	FA	FB	FE	FFS	FSE
FA					
FB	*0.826*				
FE	0.729	*0.778*			
FFS	0.741	0.794	*0.775*		
FSE	0.704	0.678	0.667	*0.637*	

Note: Values that meet or exceed the expected level are shown in italics.
Source(s): Table by authors

Table 7. Discriminant Validity- Fornell-Larcker Criterion *(second order)*

	FA	FB	FE	FFS	FSE
FA	*0.802*				
FB	0.766	*0.821*			
FE	0.604	0.629	*0.836*		
FFS	0.678	0.731	0.616	*0.822*	
FSE	0.567	0.552	0.429	0.497	*0.717*

Note: Values that meet or exceed the expected level are shown in italics.
Source(s): Table by authors

5.4 Structural Model Assessment

Table 8 illustrates the results from a structural model analysis investigating the relationships between FFS, FE, FA, FSE, and FB among young adults. The analysis revealed statistically significant relationships, supported by β coefficients, t-values, and p-values. Direct effects were evident, with FFS significantly influencing FE (β = 0.388, t = 6.179, p < 0.001), FA (β = 0.467, t = 8.860, p < 0.001), and FB (β = 0.290, t = 6.141, p < 0.001), supporting H1(a) to H1(c). Further, FE has a significant influence on FA (β = 0.330, t = 5.653, p < 0.001) and FB (β = 0.177, t = 4.455, p < 0.001), while FA significantly influences FB (β = 0.469, t = 9.113, p < 0.001). Hence, H2(a), H2(b) and H3 were supported. FE acted as a significant mediator between the relationship of FFS-FB (β = 0.069, t = 4.119, p < 0.001) and FFS-FA (β = 0.128, t = 4.279, p < 0.001), resulting in acceptance of H4(a) and H4(b). Similarly, FA was also found to significantly mediate the relationship between FFS-FB (β = 0.219, t = 6.413, p < 0.001) and FE-FB (β = 0.155, t = 4.816, p < 0.001), resulting in acceptance of H5(a) and H5(b).

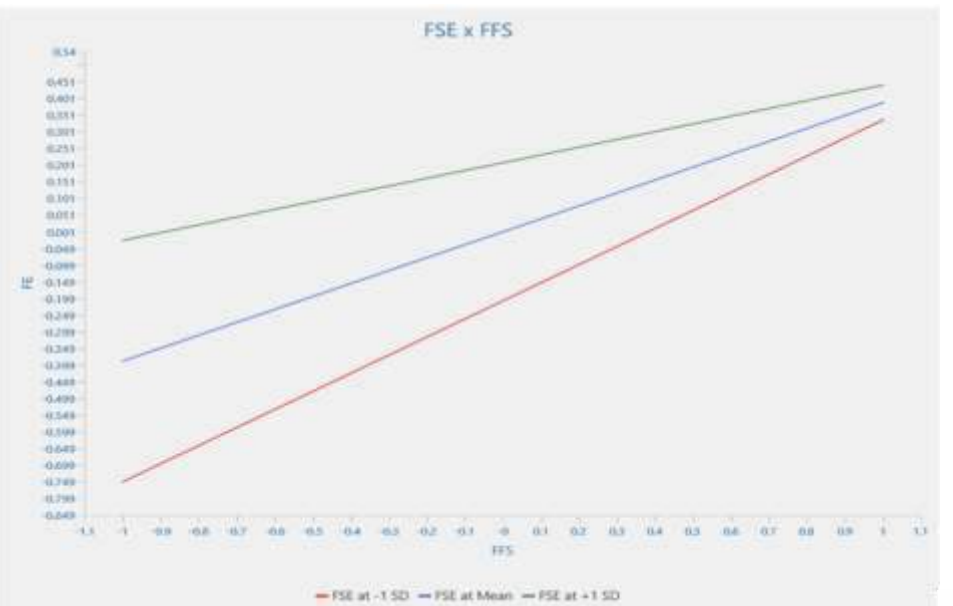
Further, the serial mediation results were also in support to H6 as evidenced by the significant path from FFS to FE to FA to FB (β = 0.060, t = 3.615, p < 0.001). After testing the

serial mediation model, FSE was added as a moderator in the relationship between FFS and FE. The moderated-mediation analyses illustrated that FSE negatively moderated the serial mediation effect of FFS on FB via FE and FA (β = -0.024, t = 2.652, p < 0.01); therefore, H7 was supported.

Table 8. Structural model results

Hypothesis	Path	β	*t*-value	*p*-values	Decision	f^2	2.5% CI LL	97.5% CI UL
	Direct Effects							
H1(a)	FFS -> FE	0.388	6.179	0.000	Supported	0.142	0.268	0.501
H1(b)	FFS -> FA	0.467	8.860	0.000	Supported	0.294	0.370	0.568
H1(c)	FFS -> FB	0.290	6.141	0.000	Supported	0.133	0.200	0.389
H2(a)	FE -> FA	0.330	5.653	0.000	Supported	0.147	0.214	0.441
H2(b)	FE -> FB	0.177	4.455	0.000	Supported	0.056	0.090	0.241
H3	FA -> FB	0.469	9.113	0.000	Supported	0.333	0.358	0.566
	Indirect Effects							
H4(a)	FFS -> FE -> FB	0.069	4.119	0.000	Supported		0.038	0.106
H4(b)	FFS -> FE -> FA	0.128	4.279	0.000	Supported		0.071	0.189
H5(a)	FFS -> FA -> FB	0.219	6.413	0.000	Supported		0.154	0.290
H5(b)	FE -> FA -> FB	0.155	4.816	0.000	Supported		0.097	0.224
	Serial Mediation							
H6	FFS -> FE -> FA -> FB	0.060	3.615	0.000	Supported		0.032	0.097
	Moderated Mediation							
H7	FSE x FFS -> FE -> FA -> FB	-0.024	2.652	0.008	Supported	0.031	-0.049	-0.011

Source(s): Table by authors



Graph 1. Simple slope analysis of the two-way interaction effect FFS*FSE on FE

Note: The upper, middle, and lower lines show the correlation for higher, average, and lower levels of the moderator variable FSE, respectively.

The correlation between FFS and FE is illustrated in Graph 1 using three lines. As evidenced by the positive slope of all three lines, the relationship between FFS and FE was positively correlated, which, in turn, affected FA and FB. Therefore, increased levels of family financial socialisation were directly correlated with increased levels of financial behaviour. The presence of a negative moderating effect caused the influence of the moderator FSE to weaken the effect of FFS on FB at high levels. Conversely, at lower levels of the moderator FSE, the effect of FFS on FB became stronger.

6. Discussion

The study examined the relationship between FFS, FE, FA and FB with the moderating role of FSE among university students. The findings revealed a positive influence of FFS on FE, FA and FB (Shim et al., 2010; Allsop et al., 2021; Khawar & Sarwar, 2021; Kim & Torquati, 2020; Lanz et al., 2020). This implies that students with financial socialisation exhibit better learning behaviour. This association is further justified by the crucial role that families play in shaping individuals' financial attitudes and behaviours. The results also revealed that there is a direct effect of FE on FA and FB of the university students, which indicates that there is a complementary influence of formal financial education initiatives and self-directed learning on the development of adults' financial attitudes and behaviors (Jin & Chen, 2020; Lusardi, 2019; Jian & Joyce, 2010; Bruhn et al., 2016). These educational initiatives empower students to shape their financial attitudes by equipping them with core knowledge about financial concepts, like budgeting, saving, investing, and debt management, enabling them to make informed financial decisions. Such financial awareness frequently results in the development of favourable financial mindsets, like placing importance on financial stability, giving priority to saving, and embracing proactive financial behaviours. Similarly, the results also supported the previous studies by Herdjiono and Damanik (2016), Potrich et al. (2016), Tang and Baker (2016), Serido et al. (2015), and Utkarsh et al. (2020) by revealing a significant relationship between FA and FB. When students have a positive outlook toward money management, they are less likely to feel overwhelmed by financial decisions and more likely to take constructive actions, such as defining financial goals, making budgets, and adhering to them (Radianto, 2020). Thus, positive financial attitudes can diminish financial concern and enhance financial confidence, thereby encouraging responsible financial behaviours. Further, the analysis revealed a significant mediating impact of FE on the association between FFS and FB, which is consistent with the studies of Clarke et al. (2005) and Xiao and O'Neill (2016) who suggested that FE complements the financial learning and behaviour initiated by parents. Moreover, FE is also found to positively mediate the relationship between FFS and FA, supporting many previous studies in this line (Carpena & Zia, 2020; Netemeyer et al., 2024). Interestingly, as per the results, FA further mediated the association between FFS and FB, which leads us to conclude that parents and family members serve as primary role models in an individual's life that not only develop financial attitudes but ultimately shape financial behaviour (Serido et al., 2013). Also, the FA is found to act as a significant mediator between FE and FB, highlighting the importance of holistic financial education that nurtures positive financial beliefs and values alongside knowledge among young adults (Sabri et al., 2020). The results also proposed that the association between FFS and FB is serially mediated by FE and FA. A plausible justification for this is that individuals who received higher levels of financial socialisation from their families are more likely to be involved in progressive financial behaviours through the enhancement of their financial education and the development of a positive financial attitude. These findings align with previous research that emphasises the significant role of family influence in shaping financial literacy and attitudes, which subsequently impact financial behavior (Gudmunson & Danes, 2011; Shim et al., 2010). Moreover, this study reveals a negative moderation of FSE between FFS and FB via FE and FA. This suggests that the indirect effects of FFS on FB through FE and FA are weakened when individuals possess higher levels of FSE. In other words, individuals with high financial self-efficacy may rely less on family-derived financial education and attitudes to guide their financial behaviours, possibly due to their confidence in their own financial management skills and knowledge (Bandura, 1997; Danes & Haberman, 2007).

7. Implications

7.1 Theoretical Implications

This research advances existing theory and literature in several significant ways. First, the proposed conceptual model of the study provides valuable insights into the phenomenon of family financial socialisation affecting financial behaviour. Second, this study extends the family financial socialisation theory by proving that family financial socialisation is not the only factor that affects the financial behaviour of young children; there are many other

variables, such as financial knowledge, financial attitude, and financial self-efficacy, which affect the financial behaviour of youngsters. Third, the proposed conceptual model provides insights into the financial behaviour of youth in Punjab, which can be highly beneficial for designing interventions and policies aimed at promoting region-specific economic opportunities for young people. Fourth, the adoption of a higher-order moderated-mediation approach represents a methodological advancement, offering a more comprehensive understanding of the intricate relationships between family financial socialisation and financial behaviour.

7.2 Practical Implications

The study offers many practical contributions for policymakers, educationalists, financial professionals, and parents. First, it supports educational institutions in designing tailor-made content and pedagogy of financial curriculum based on the capability of young people regarding better financial education to fill the existing gaps in the financial socialisation of young children. Second, by highlighting the important role of financial socialisation in youngsters' lives and the effect of financial self-efficacy on financial behaviour, this study paves the way for educators to start and end financial socialisation at the correct moment. Third, policymakers can leverage the findings of this study to design capacity-building courses that equip youth with the skills to navigate various pathways toward sustainable livelihoods in adulthood. Fourth, based on the result that early financial socialisation and support by the family result in positive financial behaviour among the youth, the administrators and educational institutions can develop youth-oriented financial capability programs that involve the parents and family as well. The involvement of families in youth capability-building interventions can increase the chances of positive financial outcomes for both the family and the children. Moreover, incorporating parents into youth financial capability interventions acknowledges that youth are embedded within families, which function as economic units with financially interdependent members. This is particularly relevant in Punjab, where the extended family concept is widely prevalent. Fifth, the financial professionals who deal in financial planning on behalf of many individuals from different backgrounds can leverage the findings of this study to increase the financial wisdom of their clients by paying particular attention to inclusion of family in their programs.

8. Limitations and Future Research Scope

Although this research contributes significantly to the existing body of literature on family financial socialisation and financial behaviour, certain limitations should be acknowledged. First, the study focuses exclusively on three aspects of family financial socialisation that shape the financial response of young individuals based on their daily interaction with parents, neglecting other potentially influential antecedents of family financial socialisation that might affect the students' financial behaviour. In the future, researchers can consider factors such as parent socio-economic status, parental financial distress, and parental expectations for enhancing the explanatory power of the model. Additionally, gender differences in socialising influences may be considered, and multi-group analysis can be performed, which could provide a better understanding of financial behaviour across different genders. Second, the convenience sampling in this study involves fundamental biases, which limit the representativeness of the sample and, subsequently, the capacity to apply the findings to a broader population. Further research can explore solutions to reduce response biases by incorporating objective measures or qualitative research methodologies to gain a more comprehensive understanding of the issue. Third, the present study is cross-sectional in nature. Scholars could examine how financial socialisation within the family influences financial behaviour by conducting qualitative and quantitative longitudinal studies. Future studies could also look at patterns of change in the financial behavior of children as they transition from childhood to adulthood and begin their careers. Fourth, the research draws conclusions on the basis of data collected exclusively from the “students”. Future research should test this model on both parents and pupils, and/or other family members as informants for acquiring multiple viewpoints on socialisation and have a better understanding. Last but not least, this study's scope is confined by geographical limitations, being concentrated primarily inside the state of Punjab, India, and does not extend to other states or nations. This restricts its generalizability to other locations globally. Every year, numerous students travel to several prominent institutions of Punjab from countries like Afghanistan, Ethiopia, South Africa, and so on. Future studies may extend the knowledge by encompassing overseas students who have relocated to Punjab from different places, thereby exploring the impact of parental financial socialisation on diverse groups and carrying out comparative analysis.

9. Conclusion

In conclusion, this research significantly enhances the understanding of family financial socialisation and its influence on financial behaviour among university students of Punjab. The pivotal role played by families in shaping financial competencies among young adults from an early age has been highlighted in this study. Besides, the weakening of the mediated relationship between financial socialisation and financial behaviour by financial self-efficacy constitutes a significant contribution to the existing literature. The findings of the study necessitate parents to be mindful of their financial interactions with their children, recognising the long-term effects these interactions can have on the financial behaviour of the children. By acknowledging the impact that students' family backgrounds and experiences have on their financial behaviour, educators can tailor their teaching strategies to better address their diverse financial attitudes, knowledge, and behaviours. This approach can enhance the effectiveness of financial education by creating a more relevant and engaging learning environment. Moreover, policymakers can leverage this study's findings to introduce better policy frameworks.

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Informationally Dominant Firms in India: Characteristics, Return Performance and Earnings Behavior

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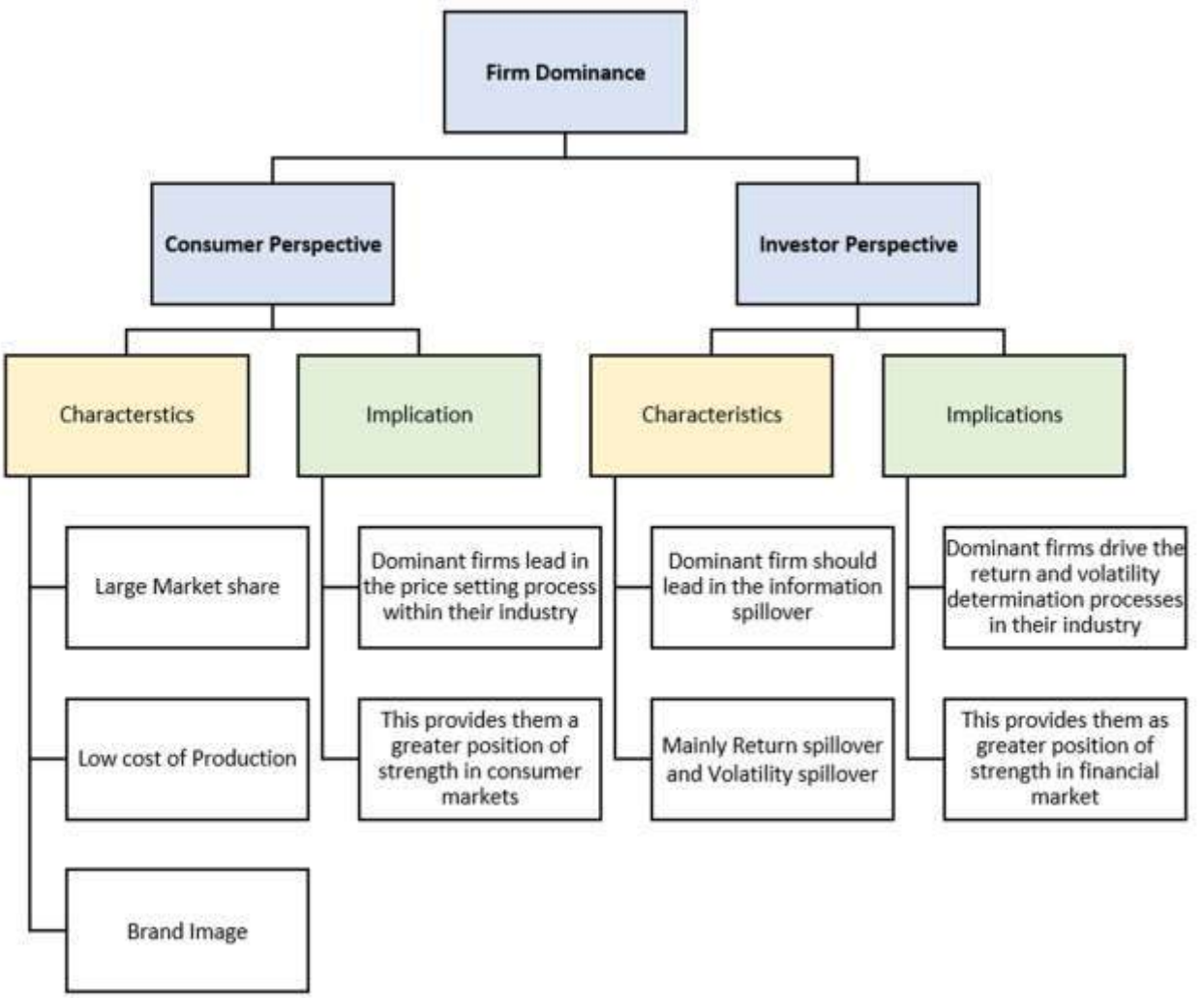
Abstract

We examine the informational dominance of firms related to capital markets, which may help investors devise better trading strategies. Objectives are: measure the information dominance of the firms, examine key characteristics of dominant firms, and evaluate the return and earnings performance of dominant and satellite firms. We observe that informationally dominant firms are stronger than satellite firms due to better operating, financial, and market characteristics. Further, the Random Forest Method predicted firm dominance better than other selected methods. We find that returns between dominant and satellite firms are not statistically significantly different. Still, informationally dominant firms provide an annualized risk-adjusted return of 1.8% higher than returns reported for satellite firms. As expected, satellite firms exhibit higher earnings surprises compared to dominant firms. Dominant firms exhibit different earnings announcement patterns for various sectors. Our study has important implications for investment managers by providing valuable insights for better designing trading strategies.

Keywords: *Informational Dominance, Earnings behavior, Return Performance, Financial Characteristics, Operating Characteristics*

1. Introduction

The concept of price dominance of firms has emerged from the theory of collusive oligopoly, which is mainly based on the price reaction of the producers. The existing literature on firm dominance primarily focuses on the product market where characteristics like low costs, higher market share in sales, or long-period presence in a sector define dominance (Kwoka, 1977; Yang, 2002; Tardiff & Weissman, 2009). Although plenty of literature is available about firm dominance in the consumer market, the literature regarding firm dominance from investors' perspectives is minimal. This can be evaluated through their stock price linkages on account of mean returns and volatility in returns with other firms in the sector. These informationally dominant firms are likely to contribute significantly to the price discovery and risk spillover process. It would be interesting to observe how stock returns and volatilities of the companies in the same industry impact each other by finding out how this information is being transmitted. Firms that are net transmitters of information are known as informationally dominant firms, while firms that are net receptors of information are informationally satellite firms. It is a new way of looking at firm dominance from investors' perspective, henceforth referred to as Financial Market Dominance.



The present study is undertaken to find the informational dominance of firms that are more related to capital markets, as investors would be interested in knowing about such dominance to make better investment decisions. The conceptual framework of the study is based on the following arguments. Dominant firms are perceived to be fundamentally stronger firms. The strength of dominant firms may be observed by their fundamental characteristics, such as higher operating efficiency, higher revenues, higher asset turnover, and lower operational costs. High operating efficiency would make them financially strong, which may be seen in their high profitability, high growth, and relatively stable earnings. Dominant firms are perceived to be larger and should have greater strategic ownership, which makes them more efficient than satellite firms. It would be pertinent to observe whether the above-mentioned fundamental characteristics can be used to differentiate dominant and satellite firms and whether these determinants can help managers forecast firm dominance for future decision-making.

The study further attempts to evaluate if information about dominant and satellite firms can be used by investment managers to form profitable trading strategies by analyzing their return performance. Since financially dominant firms are expected to be fundamentally strong, they will likely exhibit lower mis-valuation. In contrast, satellite firms that are relatively less fundamentally strong may be induced to undertake some window dressing practices. This may pose a greater valuation challenge for investors, resulting in larger pricing errors. Due to greater mis-valuation, these satellite firms may attract higher investor attention, thus pushing up their prices and lowering their returns. This may have strategic implications for portfolio managers who can go long on dominant firms and short on satellite firms in pursuit of higher returns. Alternatively, if there are short-selling restrictions, investors may focus on buying informationally dominant stocks owing to their better return potential.

Another dimension that could interest investment managers is understanding the relationship between dominant firms and their earnings behaviour. This relationship can be studied in two ways: first, by analyzing their earnings surprises, followed by observing their earnings announcement patterns. Due to less fundamental scent, Satellite firms may indulge in earnings management. Thus making it difficult for analysts to develop their earnings forecast. As a result, such firms are likely to exhibit greater earnings surprises compared to informationally dominant firms. It is also important for fund managers to know whether informationally dominant firms lead or lag in the quarterly earnings announcement process viz a viz satellite firms. The earning announcement patterns provide them with helpful information for strategically designing portfolios.

In the context of the above-mentioned background, the current study has been undertaken to analyze the firm's dominance from investors' perspective in the context of India with the following objectives: to measure the information dominance of the firms; to examine the relevant firm characteristics of dominant firms and to lay out the model design; to evaluate the return performance of dominant and satellite firms for making profitable trading strategies; to examine the earnings behaviour of dominant and satellite firms by evaluating their earnings surprises and analyzing their earnings announcement patterns. Focusing on India is important for global investors as it is the fifth-largest world economy in terms of nominal GDP and hosts the fourth-largest capital market in terms of capitalization.

The following hypotheses have been framed to undertake our study: Dominant firms are fundamentally stronger than satellite firms based on their operating, financial, managerial, and market characteristics; machine learning methods provide better forecasts of firm dominance compared to statistical approaches such as logit model; Fund managers can form profitable trading strategies by focusing on informationally dominant firms; earnings surprises in the case of satellite firms are expected to be larger than those for dominant firms; informationally dominant should firms make early earnings announcements than satellite firms during the earnings season.

The motivation for conducting this study is to look at the firm dominance from a new dimension, i.e., investor's perspective, and add to the existing scant literature on the subject. The second motivation is that the current study is also relevant to strategy formation by investment managers. If dominant and satellite firms differ based on their attributes, it would be essential to understand the character of dominant firms from a strategic point of view. Another important dimension is evaluating the return behaviour and earnings pattern of dominant and satellite firms, which may provide important insights to investment managers for profitable trading strategies.

We observe that informationally dominant firms are fundamentally stronger than satellite firms owing to better

operating, financial, and market characteristics. Further, Random Forest Method, a machine learning approach, performs better than other machine learning models and classical binomial logit models for predicting firm dominance. We find that returns between dominant and satellite firms are not statistically significantly different. However, from an investment perspective, informationally dominant firms provide an annualized risk-adjusted return of 7.8%, 1.8% higher than the returns reported for satellite firms, thus making them more attractive investments. As expected, satellite firms exhibit higher earnings surprises than those for dominant firms. We finally observe that in five major sectors, Auto, Consumer Durables, Financial Services, FMCG, and realty dominant firms make early earnings announcements compared to satellite firms. However, earnings announcement patterns for other sectors are not clear except in the case of Oil and gas, where satellite firms precede the dominant firms in the earnings announcement process.

The study has been organized into seven sections, including the present one. Section 2 deals with data and its sources, and Section 3 measures informational dominance. Section 4 examines the characteristics of dominant firms and model design. Sections 5 and 6 evaluate informationally dominant and satellite firms' return performance and earnings behavior. Conclusions are presented in the last section.

2. Literature Review

In the existing literature, attempts have been made to observe information transmission effects at market levels both for global markets as well as for Asian markets (Borenstein, 1991; Greenwood-Nimmo et al., 2016; Sehgal, Saini & Delisting, 2019; Sehgal, Bijoy & Saini 2019; Gutiérrez & Thomas, 2020; Bijoy, 2023). The same approach can be adopted to observe the information transmission at the company level to estimate information transmission among firms within their respective sectors. A firm's dominance can be established by combining the return and volatility spillover, termed total Spillover, to find out which companies transmit more information to other companies. The literature on ascertaining sector-level dominance using the information spillover technique is virtually absent.

Another interesting aspect of analyzing firm dominance would be studying what firm characteristics differentiate informationally dominant firms from the satellite firm. The existing research has examined the relationship between the fundamental characteristics and various aspects of firm performance. Sehgal et al. (2021) provide a list of important financial ratios through which the health of a company in terms of its solvency can be predicted. Similarly, Sehgal, Vashisht and Jain (2022) identify important fundamental determinants of bond ratings for emerging markets. Healthy companies with higher corporate ratings are expected to be fundamentally strong, and hence, these characteristics shall play an important role in identifying dominant firms. Thus, by taking a cue from the existing studies, the present study analyses four major characteristics (involving 14 key financial ratios) to establish the sectoral dominance of the firms.

These characteristics cover operating, financial, managerial, and market-based information. The relevant characteristics can then be used to predict firm dominance.

Further, the existing literature on company classification dealing with several corporate financial issues such as financial distress prediction, bond and sovereign ratings, identifying acquisition targets, etc., employs classical statistical models such as the binomial logit model and its variants (Khemakhem & Boujelbene, 2015; Bhattacharya & Sharma, 2019). The use of machine learning techniques for this purpose is more recent and hence limited (Mslemi et al., 2017; Charalambakis et al., 2019)

The present study adopts a more comprehensive approach and employs the traditional binomial logit model and various modern machine learning methods.

Abundant literature on long-short strategies based on stock anomalies is already available. Prominent among these are trading strategies based on firm size (Asness et al., 2018; Pandey & Mittal., 2021), value (Chan & Chen, 1991; Pandey et al., 2019), profitability (Linnainmaa & Roberts, 2018; Pandey et al., 2021) and momentum (Novy-Marx, 2012; Pandey, 2020) to name a few. However, virtually no literature examines the relationship between firm dominance and stock returns. One can hypothesize that owing to differences in their returns, fund managers can form trading strategies by going long on dominant firms and taking short positions on satellite firms to earn super-normal profits.

Dominant firms may also differ from satellite firms based on their earnings behaviour. Foster (1981) examines the impact of earnings releases on firm performance and establishes the firm dominance based on earnings releases. Subramaniam,

Sehgal, and Sharma (2017) show that in the Indian context, stocks with higher earnings surprises report higher returns. Kovacs (2016) observes that under-reaction to industry-specific information contributes to analysts' forecast-based post-announcement drift. However, the earnings surprise element can also be related to the informational dominance of firms, which is virtually ignored by previous studies. Since dominant firms are more efficient and fundamentally strong, their financial statements would be more reliable and, thus, there would be low variability in their earnings. On the other hand, satellite firms with relatively weak fundamentals may indulge in window dressing of their financial statements and, thus, may have high earnings surprises.

These earnings surprises may impact the earnings announcement patterns of dominant and satellite firms, which may be utilized by investment managers for the strategic design of their portfolios. Hann et al. (2019) observe a positive relationship between changes in implied volatility and the first earnings announcer in each industry. Saha et al. (2019) in their study found that some firms in any industry always have a chance to become dominant even if initially they are at an equal level. Sehgal and Bijoy (2015) observe significant abnormal returns in the post-earnings announcement period for Indian firms. However, no literature is available on analyzing the earning announcement patterns followed by companies and their implications for portfolio analysis. Portfolio managers tend to overweight companies with high earnings than low earnings surprises. Earnings announcements are one of the significant sources of information that helps fund managers reallocate their portfolios. They tend to change companies' weights in their portfolios depending on the information released about them. If dominant firms have low earnings surprises, they may announce their earnings early, and investors can take an early position in them and reallocate the remaining portfolio among the satellite firms. The contrary view could be that if dominant firms have low earnings surprises, they may defer their earnings announcement so that portfolio managers do not underweight them.

Thus, it would be interesting to examine the firm's dominance from investors' perspectives, as this might help them form profitable trading strategies and better manage their existing portfolios. The present study attempts to fill an important research gap in the corporate finance literature, particularly relating to the behaviour of informationally dominant firms.

2. Data and its Variables

The sectoral classification provided by "NSE Indices Publications" of the National Stock Exchange (NSE) has been considered for selecting 11 sectors for our analysis. NSE is a prominent national-level stock exchange in India that provides indices on 11 sector classifications. Since each sectoral index comprises 10 companies, we use data for 110 companies (10 companies *11 sectors) for our study, as shown in Table 1. The monthly price data on the 110 companies and the respective index values have been obtained from January 2012 to December 2022 from the Capitaline Database, a popularly used financial software in India. The starting year has been chosen carefully to avoid any impact of the Global Financial Crisis (2008-09) as well as the European Debt Crisis (2009-11), as some of the sample companies may have exposure to the European market owing to international trade linkages.

To evaluate the attributes of dominant firms, annual information of 14 firm variables has been obtained for each company in each sector for the sample period. The sample variables have been classified into four major categories: operating characteristics, financial characteristics, market characteristics, and managerial characteristics. Four operating characteristics, seven financial characteristics, three market characteristics, and one managerial characteristic have been analyzed, and their details have been provided in Table 2. We assess the firm's business operations by examining its operating revenue, asset turnover, efficiency, and leverage. The company's financial profile is gauzed by evaluating its profitability, growth, asset structure, solvency, safety (interest coverage ratio), liquidity, and earnings variability. We use two market characteristics for each firm: firm size and valuation ratio (Price to Book Value (PB)). Strategic ownership is used as a proxy for management quality. 91-day treasury bills are a proxy for risk-free rates from the Reserve Bank of India (Central Bank of India) website.

Table 1. List of Sample Companies

AUTO	Code	BANK	Code	C Durables	Code	Financial Services	Code	FMCG	Code	IT	Code
Ashok Leyland Ltd.	1	Axis Bank Ltd.	1	Bata India Ltd.	1	Axis Bank Ltd.	1	Britannia Industries Ltd.	1	H C L Technologies Ltd.	1
Bajaj Auto Ltd.	2	Bandhan Bank Ltd.	2	Blue Star Ltd.	2	Bajaj Finance Ltd.	2	Colgate-Palmolive (India) Ltd.	2	Hexaware Technologies Ltd.	2
Bosch Ltd.	3	Bank Of Baroda	3	Crompton Greaves Consumer Electricals Ltd.	3	Bajaj Finserv Ltd.	3	Dabur India Ltd.	3	Infosys Ltd.	3
Eicher Motors Ltd.	4	Federal Bank Ltd.	4	Havells India Ltd.	4	H D F C Bank Ltd.	4	Godrej Consumer Products Ltd.	4	Just Dial Ltd.	4
Hero Motocorp Ltd.	5	H D F C Bank Ltd.	5	Rajesh Exports Ltd.	5	H D F C Life Insurance Co. Ltd.	5	Hindustan Unilever Ltd.	5	Mindtree Ltd.	5
M R F Ltd.	6	I C I C I Bank Ltd.	6	Relaxo Footwears Ltd.	6	Housing Development Finance Corpn. Ltd.	6	I T C Ltd.	6	N I I T Technologies Ltd.	6
Mahindra & Mahindra Ltd.	7	Indusind Bank Ltd.	7	Titan Company Ltd.	7	I C I C I Bank Ltd.	7	Marico Ltd.	7	Tata Consultancy Services Ltd.	7
Maruti Suzuki India Ltd.	8	Kotak Mahindra Bank Ltd.	8	V-Guard Industries Ltd.	8	Kotak Mahindra Bank Ltd.	8	Nestle India Ltd.	8	Tata Elxsi Ltd.	8
Motherson Sumi Systems Ltd.	9	R B L Bank Ltd.	9	Voltas Ltd.	9	S B I Life Insurance Co. Ltd.	9	Tata Consumer Products Ltd.	9	Tech Mahindra Ltd.	9
Tata Motors Ltd.	10	State Bank Of India	10	Whirlpool Of India Ltd.	10	State Bank Of India	10	United Spirits Ltd.	10	Wipro Ltd.	10
Nifty Auto		Nifty Bank		Nifty Consumer Durables		Nifty Financial Services		Nifty Fmcg		Nifty It	

Media	Code	Metal	Code	Oil &Gas	Code	Pharma	Code	Reality	Code
D B Corp Ltd.	1	Coal India Ltd.	1	Bharat Petroleum Corpn. Ltd.	1	Aurobindo Pharma Ltd.	1	Brigade Enterprises Ltd.	1
Inox Leisure Ltd.	2	Hindalco Industries Ltd.	2	Castrol India Ltd.	2	Biocon Ltd.	2	D L F Ltd.	2
Jagran Prakashan Ltd.	3	Hindustan Zinc Ltd.	3	G A I L (India) Ltd.	3	Cadila Healthcare Ltd.	3	Godrej Properties Ltd.	3
Jump Networks Ltd.	4	J S W Steel Ltd.	4	Gujarat State Petronet Ltd.	4	Cipla Ltd.	4	Indiabulls Real Estate Ltd.	4
Network18 Media & Invst. Ltd.	5	Jindal Steel & Power Ltd.	5	Hindustan Petroleum Corpn. Ltd.	5	Divi'S Laboratories Ltd.	5	Mahindra Lifespace Developers Ltd.	5
P V R Ltd.	6	N M D C Ltd.	6	Indian Oil Corpn. Ltd.	6	Dr. Reddy'S Laboratories Ltd.	6	Oberoi Realty Ltd.	6
Sun T V Network Ltd.	7	National Aluminium Co. Ltd.	7	Indraprastha Gas Ltd.	7	Glenmark Pharmaceuticals Ltd.	7	Phoenix Mills Ltd.	7
T V Today Network Ltd.	8	Steel Authority Of India Ltd.	8	Oil & Natural Gas Corpn. Ltd.	8	Lupin Ltd.	8	Prestige Estates Projects Ltd.	8
Tv18 Broadcast Ltd.	9	Tata Steel Ltd.	9	Petronet L N G Ltd.	9	Piramal Enterprises Ltd.	9	Sobha Ltd.	9
Zee Entertainment Enterprises Ltd.	10	Vedanta Ltd.	10	Reliance Industries Ltd.	10	Sun Pharmaceutical Inds. Ltd.	10	Sunteck Realty Ltd.	10
Nifty Media		Nifty Metal		Nifty Oil and Gas		Nifty Pharma		Nifty Realty	

Source: Capitaline Database

Table 2. Firm Characteristics and Informational Dominance

We examine operating, financial, market, and managerial characteristics relevant for classifying informationally dominant and satellite firms. These characteristics are measured using several variables which are specified below**.**

S.No	Firm Characteristics	Variables	Measure
1	Operating Characteristics	Asset Turnover	Net Sales by Total Assets
2		Operating Efficiency	Operating Cost to Sales
3		Operating Revenues	Natural Log of Net Sales
4		Operating Leverage	Degree of Operating Leverage
5	Financial Characteristics	Structure	Fixed Asset/Total Asset
6		Profitability	Return on capital employed
7		Growth	Growth in ROCE
8		Leverage	Debt to Equity
9		Safety	Interest Coverage Ratio
10		Liquidity	Cash Flow from Operations/ Total Asset
11		Earnings Variability	Standard deviation in earnings over last 12 quarters
12	Market Characteristics	Multiple	Price to Book Value (P/B)
13		Size	Natural log of Market capitalization
14	Managerial Characteristics	Strategic Ownership	Percentage of institutional owners as compared to total ownership

Source: Authors' selection

4. Measuring Informational Dominance

We identify informationally dominant and satellite companies out of the ten select companies in each sector from January 2012 to December 2022. Firm dominance may be determined by calculating and comparing the total net spillovers (TNS) for each company, which in turn is the sum of Net Return spillovers (NRS) and Net Volatility Spillovers (NVS). Diebold and Yilmaz's (2012) Spillovers index methodology examines the return and volatility spillovers among the sample companies of the select sectors. This methodology is based on the Vector Autoregressive (VAR) framework, which allows testing the spillovers within and cross-over the variables. It quantifies the contribution of shocks to and from each variable in terms of their returns and variances, providing the magnitude and direction of spillovers. Diebold and Yilmaz (2012) apply the generalized VAR framework of Koop et al. (1996) and Pesaran and Shin (1998), which yields forecast-error variance decompositions that are invariant to the ordering of the variables.

Monthly prices of ten companies for each of the eleven sectors and their Nifty sectoral index for the given period are taken to determine informationally dominant and satellite companies in each sector. The eleven years are divided into nine subperiods of 36 months each with 12 months moving data like 2012 to 2014, 2013-2015, and so on till 2020-2022. The log return of each company is used to calculate the return spillovers, whereas conditional volatility from the EGARCH (1,1) series is used to calculate volatility spillovers. The net Spillover is the net contribution to other companies less than the contribution from other companies. There are two results for each company in a sector, namely NRS and NVS, which sum to TNS. This TNS is used to determine the dominant and satellite companies. The dominant companies exhibit the highest positive TNS values, whereas satellite companies' net spillover values are negative. Three dominant and three satellite companies for each sector are shortlisted based on their relative rankings on the magnitude of positive and negative net spillovers, respectively, as shown in Table 3. For only two companies with positive/ negative TNS, reporting of Dominant/ Satellite companies has been restricted to those two companies for that time frame. Thus, our dominant companies are the largest net transmitters of information in the first two moments, while the satellite companies are the largest net receptors of such information.

We estimate net return and volatility spillovers for the sample firms. Net return spillover (NRS) is defined as the difference between the percentage return of other companies in a sector explained by company I and the percentage returns of the company i explained by other sectoral firms. Net volatility spillover (NVS) is also defined similarly. Total Net Spillover (TNS) is the sum of each company's net return and net volatility spillover. Companies with high positive TNS are classified as dominant firms while those with negative TNS are referred to as satellite firms.

From Table 3, it is clear that the top three dominant companies in the Auto sectors are Ashok Leyland, Bajaj Auto, and Hero Motocorp, as they exhibit higher total net spillovers for eight-, six-, and four times, respectively, over nine years of observations. The three bottom companies in the sector are Tata Motors, which exhibits seven times the highest negative total net spillovers, followed by Motherson Sumi System and MRF. This dominant and satellite behaviour among the Banks is extreme and stable. Axis Bank exhibited the highest positive spillovers for all nine years, followed by Bank of Baroda and HDFC Bank. On the bottom side of the banking sector, SBI is the highest net receptor of information, along with IndusInd Bank and Kotak Mahindra Bank. Bata India, Blue Star, and Rajesh Exports are the three top dominant consumer durables companies exhibiting nine, seven, and four times higher positive net spillovers. In contrast, the three bottom companies are Whirlpool of India, Titan Company, and Voltas. In the Financial Service sector, Axis Bank Financial Services and Bajaj Financial Service are the two dominant companies with over 75% of the net spillover rate, followed by HDFC Financial Service. SBI Financial Service, Kotak Mahindra Financial Service, and Housing Development Finance Corporation Ltd are the three bottom companies in the sector.

Britania Industries, Colgate-Palmolive (India), and Dabur India are the three top dominant FMCG companies exhibiting the highest net total spillovers eight, six, and five times. In contrast, United Spirits, Tata Consumer Products, and Nestle India are three satellite companies with maximum negative net spillover value for the sample period. HCL Technologies exhibits the highest positive spillovers for all nine years, followed by Hexaware Technologies and Infosys, making them the top three dominant companies in

Table 3. Total Net Spillovers for informationally dominant and satellite firms in each sector

	2012-14			2013-15			2014-16			2015-17			2016-18			2017-19			2018-20			2019-21			2020-22		
Co Code		Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS	Co Code	Position	TNS
Auto																											
	1	D1	347	1	D1	268.3	1	D1	176	1	D1	88.1	2	D1	94	2	D1	149.8	2	D1	225.4	1	D1	431.1	1	D1	346.2
	2	D2	103.6	3	D2	79.6	3	D2	169.4	10	D2	49.1	3	D2	79.5	1	D2	88.9	1	D2	196.8	4	D2	197.9	2	D2	116.9
	5	D3	8.6	8	D3	78.7	5	D3	90	7	D3	46.5	5	D3	77.7	4	D3	60.4	8	D3	45.2	2	D3	83.5	4	D3	14.3
	10	S1	-144.4	10	S1	-137.8	10	S1	-124.4	6	S1	-117.8	10	S1	-147.8	10	S1	-137.8	10	S1	-182.6	9	S1	-140.1	10	S1	-89.8
	6	S2	-102.7	6	S2	-76.7	6	S2	-66.8	9	S2	-66.8	6	S2	-107.8	9	S2	-67.8	9	S2	-101.9	10	S2	-107.1	9	S2	-84.9
	9	S3	-88.6	9	S3	-65.8	9	S3	-52.6	8	S3	-7.2	9	S3	-61.6	6	S3	-61.5	7	S3	-90.9	6	S3	-99	6	S3	-74.6
Bank																											
	1	D1	601.9	1	D1	566.2	1	D1	667.4	1	D1	714.1	1	D1	549.7	1	D1	377.6	1	D1	320.2	1	D1	288.7	1	D1	246.7
	5	D2	3.8	5	D2	58.3	3	D2	25	3	D2	9.4	4	S1	-104.1	3	D2	142.5	3	D2	164.2	5	D2	96.6	3	D2	72.2
	7	S1	-163.6	7	S1	-142.6	7	S1	-133.6	10	S1	-134.1	7	S2	-67.9	4	D3	51.8	4	D3	59	6	D3	38.6	5	D3	32.8
	10	S2	-122.7	8	S2	-109.3	10	S2	-116.1	4	S2	-133.3	3	S3	-66.5	8	S1	-134.4	10	S1	-140.2	9	S1	-133.8	9	S1	-118.8
	8	S3	-111.9	10	S3	-98.7	4	S3	-106.2	7	S3	-125				10	S2	-136.4	7	S2	-96.6	10	S2	-114.8	10	S2	-93
																6	S3	-92.2	8	S3	-97.9	8	S3	-96.9	8	S3	-55
C Dumbles																											
	2	D1	572.6	2	D1	159.9	2	D1	209.5	2	D1	286	1	D1	294.2	2	D1	293	1	D1	300.7	3	D1	124.9	1	D1	211.5
	1	D2	62	1	D2	141.4	1	D2	148	1	D2	90	2	D2	156.1	1	D2	102.1	2	D2	88.8	1	D2	114.5	3	D2	102
	10	S1	-160	7	S1	-154.8	4	D3	55.8	5	D3	21.8	5	D3	14.5	4	D3	62.7	5	D3	60.8	4	D3	105.1	5	D3	56.2
	8	S2	-158	10	S2	-129.2	10	S1	-145.8	10	S1	-115.1	10	S1	-93.9	7	S1	-114.8	6	S1	-124.2	8	S1	-112.9	7	S1	-138
	5	S3	-127.9	9	S3	-68.8	7	S2	-123.8	7	S2	-98.8	9	S2	-98.7	6	S2	-104.3	8	S2	-114.8	9	S2	-92.7	9	S2	-103.3
							9	S3	-83.4	9	S3	-91.9	7	S3	-90.2	10	S3	-68.1	7	S3	-96.6	6	S3	-87.2	10	S3	-82.2
Fin Services																											
	1	D1	461	1	D1	455.2	1	D1	574.3	1	D1	508.4	1	D1	444.2	1	D1	334.5	1	D1	333.1	1	D1	225.9	1	D1	286.4
	3	D2	93.2	4	D2	4.8	3	D2	46.8	3	D2	23.3	3	D2	176.3	3	D2	133.2	3	D2	172	3	D2	88.4	6	D2	113.1
	2	D3	14.5	6	S1	-135.4	2	D3	28.2	6	D3	26.5	10	S1	-124.8	7	D3	33.2	4	D3	20.6	4	D3	36.9	4	D3	73.2
	7	S1	-156.7	8	S2	-107.6	10	S1	-146	10	S1	-144.7	7	S2	-133.5	10	S1	-153.9	10	S1	-120.4	10	S1	-133.2	8	S1	-141.5
	8	S2	-129.7	7	S3	-95.6	8	S2	-114.3	7	S2	-82.2	6	S3	-84.1	8	S2	-116.5	8	S2	-107.5	2	S2	-86.6	10	S2	-133.5
	10	S3	-127.5				6	S3	-109.1	8	S3	-72.6				6	S3	-68.5	6	S3	-97.7	8	S3	-80.4	9	S3	-126.5
FMCG																											
	1	D1	461	1	D1	403.4	2	D1	159.7	3	D1	119.4	1	D1	136.4	3	D1	195.9	2	D1	210.9	1	D1	164.5	1	D1	304.1
	4	D2	264.1	3	D2	94.1	1	D2	75.7	2	D2	69.4	5	D2	84	1	D2	85.2	1	D2	107.7	3	D2	133.2	2	D2	69.6
	6	D3	39	4	D3	63.1	3	D3	74.4	5	D3	55.4	2	D3	75.7	6	D3	78	6	D3	64.1	2	D3	77.2	5	D3	10.6
	10	S1	-195.7	10	S1	-155.2	10	S1	-139.8	10	S1	-121.6	9	S1	-109.6	10	S1	-135.7	9	S1	-123.8	9	S1	-80.6	9	S1	-91.4
	9	S2	-170	9	S2	-111.6	8	S2	-118.4	8	S2	-44.5	20	S2	-108.3	8	S2	-96.4	8	S2	-47.2	20	S2	-57	8	S2	-75.9
	8	S3	-143.2	8	S3	-98.6	9	S3	-68.8	9	S3	-96.2	8	S3	-97.5	9	S3	-64.9	5	S3	-44.1	7	S3	-55.7	10	S3	-63.7
IT																											
	1	D1	208.5	1	D1	239.9	1	D1	287.8	1	D1	268.6	1	D1	246.9	1	D1	294.4	1	D1	244.8	1	D1	204.2	1	D1	180.4
	3	D2	149.7	2	D2	106.4	2	D2	199.3	3	D2	202.7	2	D2	123.8	2	D2	114.1	4	D2	50.6	5	D2	80.3	3	D2	150.5
	8	D3	62.8	3	D3	59.5	3	D3	149.5	8	D3	26.5	3	D3	55.9	3	D3	69.2	3	D3	97.1	2	D3	70.6	2	D3	52.5
	10	S1	-180.1	20	S1	-139.7	20	S1	-156.5	20	S1	-161.3	20	S1	-157.6	20	S1	-155.2	20	S1	-151.6	9	S1	-106.2	10	S1	-130.1
	9	S2	-91.6	7	S2	-53.9	7	S2	-127	7	S2	-119.6	9	S2	-126.4	8	S2	-136.1	7	S2	-101.5	20	S2	-108.8	9	S2	-85.9
	5	S3	-56.5	6	S3	-52.1	6	S3	-94.4	9	S3	-75.8	8	S3	-78.1	9	S3	-111.2	8	S3	-83.5	7	S3	-57.6	7	S3	-80.7

Table 3. Total Net Spillovers for informationally dominant and satellite firms in each sector

Media																									
5	D1	88.5	2	D1	288.4	2	D1	226.7	5	D1	167.1	7	D1	124.3	2	D1	219.8	1	D1	220.7	3	D1	215	2	D1	52
2	D2	68.3	1	D2	214.1	1	D2	126.4	2	D2	106.2	2	D2	108.2	7	D2	64.8	3	D2	211.2	1	D2	41.6	3	D2	31.2
1	D3	42.5	3	D3	59.3	3	D3	30.2	1	D3	30.4	1	D3	24.4	1	D3	33.7	2	D3	42.7	2	D3	37.1	5	D3	27.7
8	S1	-144.6	8	S1	-230.9	8	S1	-148.7	10	S1	-144.6	10	S1	-152.7	10	S1	-127	10	S1	-140.9	10	S1	-129.6	7	S1	-107.5
10	S2	-155.7	10	S2	-309.6	10	S2	-198.6	9	S2	-106.4	9	S2	-121.9	9	S2	-95.5	9	S2	-105.2	9	S2	-106.6	6	S2	-61.2
9	S3	-54.9	7	S3	-306.9	7	S3	-186.5	7	S3	-91.1	6	S3	-66	8	S3	-85.6	8	S3	-68.6	5	S3	-73.7	10	S3	-33.2
Metal																									
2	D1	549.5	2	D1	264.3	2	D1	249.2	1	D1	388.8	2	D1	244.9	1	D1	218.5	2	D1	258.6	2	D1	358.3	2	D1	204.2
5	D2	122.1	1	D2	219.9	3	D2	78.4	2	D2	244.8	1	D2	152.9	3	D2	188	5	D2	78.8	1	D2	85.5	1	D2	182.8
7	D3	38.4	5	D3	233.1	5	D3	78.1	3	D3	115.7	3	D3	139.7	7	D3	82.9	1	D3	27.4	3	D3	57.3	3	D3	37.7
10	S1	-158.5	20	S1	-378.2	20	S1	-150.3	9	S1	-106.6	9	S1	-126	9	S1	-140.5	9	S1	-83.7	20	S1	-128.7	9	S1	-96.9
4	S2	-198.4	9	S2	-267.1	9	S2	-111.2	20	S2	-108.5	6	S2	-108.2	10	S2	-127	10	S2	-70.5	8	S2	-74.7	20	S2	-90.2
6	S3	-127.7	4	S3	-111	7	S3	-55.6	8	S3	-127.7	8	S3	-108.3	6	S3	-118.1	8	S3	-65.5	9	S3	-68.2	8	S3	-88.7
Oil &Gas																									
1	D1	450.5	1	D1	521.7	1	D1	397.5	1	D1	253.4	1	D1	185.2	1	D1	156.6	1	D1	330.6	1	D1	294	3	D1	226.1
3	D2	116.7	5	D2	59.2	2	D2	72.3	4	D2	95.4	2	D2	121.2	5	D2	101.4	3	D2	135.1	8	D2	118.9	1	D2	142.5
2	D3	28.5	2	D3	28.6	4	D3	46.1	2	D3	70.3	3	D3	89.8	3	D3	94.5	2	D3	15.6	3	D3	62.3	2	D3	82.5
9	S1	-137.9	9	S2	-319.7	20	S1	-148.5	20	S2	-124.9	10	S1	-153.9	10	S1	-178.1	10	S1	-256.1	9	S1	-185.8	8	S1	-134.3
10	S2	-182.4	20	S2	-367.5	9	S2	-133.2	8	S2	-102.9	5	S2	-62.9	9	S2	-117.7	9	S2	-67.3	20	S2	-367	6	S2	-115.9
8	S3	-214	8	S3	-76.9	8	S3	-100.2	5	S3	-78.4	9	S3	-61.5	8	S3	-68.2	6	S3	-67.3	6	S3	-82.9	7	S3	-88.5
Pharma																									
1	D1	370.5	2	D1	294.9	1	D1	197.4	1	D1	113.1	6	D1	305.4	4	D1	444.7	6	D1	388.9	1	D1	190.5	1	D1	157.6
2	D2	48.2	1	D2	238.7	3	D2	50.5	6	D2	102.8	1	D2	162	5	D2	226	2	D2	385.8	7	D2	98.6	2	D2	84.5
4	D3	17.7	8	S3	-97.8	4	D3	25.9	4	D3	58.7	10	S1	-164.4	6	D3	52.5	1	D3	52.6	2	D3	82.9	7	D3	83.6
10	S1	-184.7	20	S2	-78.2	20	S1	-96.5	20	S1	-300	9	S2	-71.4	10	S1	-185.7	10	S1	-267.6	20	S1	-166.8	20	S1	-178.1
7	S2	-76.8	7	S3	-79.5	9	S2	-57.6	5	S2	-48	2	S3	-64.4	7	S2	-221.6	7	S2	-45.3	9	S2	-60.3	6	S2	-65.6
5	S3	-50.2				8	S3	-34.1	9	S3	-29.5				9	S3	-109.3	4	S3	-14.6	6	S3	-67.5	9	S3	-51.5
Realty																									
1	D1	330.5	1	D1	328.5	1	D1	325.1	1	D1	294.9	1	D1	283.6	1	D1	522.3	1	D1	466.7	1	D1	396.6	1	D1	304
2	D2	111.5	5	D2	94.7	2	D2	79.9	2	D2	254.5	2	D2	295.7	5	D2	86.9	2	D2	81	2	D2	93	5	D2	161.4
7	D3	76.1	2	D3	69.9	7	D3	28	3	D3	76.7	3	D3	58.8	2	D3	37.7	6	D3	21.2	3	D3	33.5	2	D3	65.8
5	S1	-167.4	10	S1	-174.7	8	S1	-129.2	9	S1	-132.1	8	S1	-144.3	10	S1	-133.6	10	S1	-151.5	10	S1	-131.9	8	S1	-98.6
9	S2	-134.5	9	S2	-321.3	9	S2	-101.2	8	S2	-124.8	10	S2	-119.7	8	S2	-132.4	7	S2	-108	4	S2	-94.6	7	S2	-85.6
10	S3	-122.4	8	S3	-98.6	20	S3	-96.5	20	S3	-116.8	9	S3	-115.8	5	S3	-62.7	8	S3	-107	8	S3	-89.3	9	S3	-75.8

Source: Authors' computation

the IT sector. The sector's three satellite companies are Wipro, Tech Mahindra, and Tata Consultancy Services.

Inox Leisure, DB Corp, and Jagran Prakashan are three dominant media companies exhibiting nine-, eight- and five-times positive net spillovers among the top three positions. Zee Entertainment Enterprises, TV18 Broadcast, and TV Today Network achieve three bottom positions by being net receptors of spillovers. For the metal Sector, Hindalco Industries, Coal India, and Hindustan Zinc are the top three dominant companies as they appear over 55% of the time in the top three dominating positions. In contrast, Tata Steel, Vedanta, and Steel Authority of India occupy three bottom positions. Bharat Petroleum Corporation, Castrol India, and GAIL are the three top dominant Oil and gas companies with over 65% time in the top three positive total net spillovers, respectively. Similarly, Reliance Industries, Petronet LNG, and Oil & Natural Gas Corporation are three satellite oil and gas companies with the highest negative net spillovers.

Aurobindo Pharma, Biocon, and Dr Reddy's Laboratories are the top three dominant Pharma companies. In contrast, Sun Pharmaceutical Industries, Piramal Enterprises, and Glenmark Pharmaceuticals are three satellite companies showing negative net spillovers nine, six, and four times. Brigade Enterprises exhibits the highest positive net spillovers for all nine years in the realty sector, followed by DLF and Godrej Properties. Suntech Realty, Prestige Estates Projects, and Sobha Developers are the three bottom companies with relatively higher negative net spillovers.

In the next section, these dominant and satellite companies determined based on TNS are further analyzed based on their firm-specific characteristics to verify whether fundamental strength plays any role in identifying dominant and satellite companies.

5. Informationally Dominant Firms: Characteristics and Model Design

We next identify the important firm characteristics of dominant firms and evaluate statistical and machine learning methods for model estimation. We first use the statistical approach, i.e., binomial logistic regression, to identify the critical determinants of dominant firms. The dichotomous dependent variable takes a value of 1 for dominant firms and 0 for satellite firms, and independent factors are firm-level variables, as given in Table 2. The prior literature has used traditional statistical techniques, including logistic regressions, probit models, or linear discriminant analysis (Steenackers & Goovaerts, 1989; Stepanova & Thomas, 2001; Kumar & Bhattacharya, 2006; Gray et al., 2006; Khemakhem & Boujelbene, 2015; Bhattacharya & Sharma, 2019).

The fourteen independent firm variables have been classified into four categories: operating characteristics, financial characteristics, market characteristics, and managerial characteristics. The logistic regression results are provided in Table 4. We employ four operating characteristics: operating revenue, asset turnover, operating efficiency, and operating leverage. We hypothesize that dominant firms should be operationally strong in their sales revenue. Dominant firms should also be efficient both in terms of turnover and cost. The asset turnover of dominant firms should be high, meaning they can efficiently utilize their assets. The second aspect is that they should have low operational costs, which would help increase their profitability. The fourth measure we use is operating leverage. We expect dominant firms to have high operating leverage to play it to their advantage owing to higher sales and lower operating costs. It can be seen from Table 2 that the coefficients of operating revenues and asset turnover are statistically significantly positive at the 5% level, implying that dominant firms not only have larger revenues but also generate them in an operationally more efficient manner. Dominant firms also exhibit higher cost efficiency, as shown by the significantly negative value of the operating cost to sales ratio coefficient. As expected, the coefficient of operating leverage is positive, though it is statistically significant only at a 10% level (on a one-tail basis). Thus, our operating measures behave in the manner we have hypothesized.

We use 4 operating, 7 financial, 2 market, and 1 managerial characteristic as independent variables in the binomial logit framework for identifying firm dominance. The statistical significance of variables is interpreted at a 5% level of significance.

Table 4. Binomial Logit Estimation for Identifying key characteristics of informationally dominant firms

Characteristics	Estimate	z value
(Intercept)	0.6978	0.7727
Asset Turnover	0.6234	2.1948
Operating Efficiency	-4.2741	-2.9908
Operating Revenues	0.5969	3.6460
Operating Leverage	0.0145	1.5465
Structure	1.2731	2.1105
Profitability	0.0324	2.5737
Growth	-0.0178	-0.2411
Leverage	0.0174	0.1209
Safety	-0.0069	-1.9312
Liquidity	0.3740	0.2433
Earnings Variability	-0.0158	-1.6832
Multiples	-0.0814	-2.4066
Size	0.3811	2.2307
Strategic Ownership	0.0094	1.0661

Source: Authors' computation

We also expect dominant firms to be financially stronger than satellite firms. We examine seven financial variables to confirm our argument. We believe dominant firms should exhibit higher profitability and earnings growth vis-à-vis satellite firms. We also expect dominant firms to have higher fixed assets in their asset structure as fixed assets are expected to generate greater profits than current assets. Dominant firms may exhibit a lower preference for safety. Higher profitability may give them the confidence to operate at lower interest coverage ratios. These firms may also be more stable and exhibit lower earnings variability. Dominant firms may also demonstrate higher liquidity, but this may not be true in a scenario where these firms give more importance to higher profitability and, hence, may sacrifice some liquidity in the trade-off. Finally, we assume that since dominant firms are more profitable, they can afford higher financial leverage to gain from equity trading. The safety argument implies that dominant firms may exhibit lower financial leverage.

Our results confirm that dominant firms are more profitable and exhibit a higher fixed assets to total assets ratio, as expected. However, earnings growth does not seem to play a significant role in distinguishing dominant firms from satellite firms. As hypothesized, the dominant firms exhibit lower interest coverage and earnings variability. Financial leverage and firm liquidity do not seem to play an essential role in identifying firm dominance. In sum, dominant firms exhibit greater profitability and earnings stability and are willing to operate at lower safety margins.

Apart from operating and financial characteristics, we also use two market characteristics and a managerial characteristic to identify dominant firms. The two market characteristics we employ are size and PB ratio. We assume dominant firms should be larger than satellite firms and have low PB ratios. PB ratios in India are generally positive (Pandey et al., 2019). Hence, a low PB ratio shall imply lower mis-valuation, which is understandable as dominant firms are fundamentally more robust in their operating and financial characteristics. The fundamental strength may induce better corporate disclosures, resulting in lower mis-valuation. As hypothesized, we find dominant firms to be larger, and further, they exhibit low PB ratios compared to satellite firms. However, strategic ownership as a measure of managerial characteristic is found to be statistically insignificant in the Indian context.

Thus, informationally dominant firms are larger in size and operations, operationally more efficient, both on the revenue and cost side, exhibit higher profitability, lower earnings variability and trade at relatively lower PB ratios. Further, they take greater exposure to operating leverage due to stronger sales and are willing to operate at lower coverage ratios due to more substantial profits. The logit procedure provides 10 (out of 14) significant explanatory variables. Thus, we accept our hypothesis that fundamental factors significantly segregate dominant and satellite firms.

In the next step, we attempt to re-confirm fundamental determinants of firm dominance using the Random Forest (RF) method, a machine learning procedure. RF factor has been applied in prior research to identify key credit rating factors and is highly accurate (Addo et al., 2018; Wallis et al., 2019; Moscatelli et al., 2020; Wang and Ku, 2021). Breimann (2001) provides a detailed argument about RF. RF method starts by applying the bootstrap algorithm to generate different subsets using the original training set. Decision Trees, also known as base learners of each subset, are subsequently trained on these subsets. RF is a dual diversity Decision Tree (DT) that combines bagging and random space feature selection to merge the individual decision trees. In the next two steps, randomness is explicitly introduced in the model. First, each subset randomly selects N (sample size) data from the original sample, and in this way, T subsets are generated. The subsets so generated are independent of each other. Secondly, an

unpruned tree is constructed from each subset using random subspace feature selection to generate splits. It results in a reduced correlation between different trees in the forest. Each tree votes for the dominant class at the point t∈ T, with the final class obtained by majority rule (Breiman, 2001). Our analysis takes T, and the number of randomly sampled variables as candidates at each node equals one thousand. *n*, the number of trees in the forest is 2 in the model, given the achieved optimality of the model. RF method also offers variable rankings based on their relevance and estimates which variables are significant in the classification considering the interaction between variables (Polamuri, 2017; Wang et al., 2020).

MeanDecreaseAccuracy provides a rough estimation of the loss in prediction performance when that variable is omitted from the training set. *MeanDecreaseGini* measures the relevance of that variable for correct classification. GINI is a measure of node impurity. The highest purity implies that every node has only elements of a single class. Assessing the decrease in GINI when that feature is omitted leads to understanding how important that feature is in correctly splitting the data. Both these measures are used to rank variables in terms of importance, and thus, their absolute values are disregarded.

The results of the RF model are provided in Table 5. All 14 determinants we use play a significant role in predicting informationally dominant firms. Hence, we employ the entire factor structure for testing the accuracy of alternative prediction models. For prediction purposes, we employ the traditional bi-nominal logit model and three popular machine learning approaches, namely RF, Support vector Machine (SVM) and Artificial Neural Networks MultilayerMultilayer Perceptron (ANN-MLP).

We use the random forest method, a machine learning approach, for reconfirming key factors that distinguish dominant from satellite firms. All the 14 explanatory variables are found to be statistically significant at a 5% level.

Table 5. Random Forest estimations for reconfirming the factors which determine informational dominance

	0	1	MeanDecreaseAccuracy	MeanDecrease Gini
Asset Turnover	0.0271753	0.0386622	0.0326882	14.714454
Operating Efficiency	0.0190643	0.041822	0.0300456	14.805461
Operating Revenues	0.0247067	0.0375196	0.0307936	14.326668
Operating Leverage	0.0255412	0.0133352	0.0195059	13.475745
Structure	0.0497337	0.0684793	0.0586584	19.845644
Profitability	0.0416518	0.0518764	0.0464282	15.62861
Growth	0.0050294	0.0103499	0.0074923	10.052483
Leverage	0.0126068	0.0223831	0.0173231	9.8061903
Safety	0.0176433	0.0193893	0.018449	8.4720431
Liquidity	0.010113	0.0299506	0.0197099	12.021896
Earnings Variability	0.0225534	0.0260902	0.0242893	12.806048
Multiples	0.0244059	0.0327082	0.0284688	12.922775
Size	0.0194323	0.0298389	0.0243542	12.478313
Strategic Ownership	0.0419397	0.0502564	0.0459962	17.894242

Source: Authors' computation

The logit and RF methods have been described above. The algorithm of SVM works on three basic principles, viz., the maximum margin classifier, the support vector classifier, and the kernel trick. The first principle of the maximum margin classifier tries to construct a hyperplane of p-1 dimensions within a p-dimension space with a maximum margin around the identified support vector points. The training observations nearest to the boundaries of the margin are named support vectors. On the top of the maximum margin classifier, a penalty parameter is introduced by the Support vector classifier (SVC), which protects against the overfitting of the model. This penalty parameter 'Cost' has been kept at a value of 5, where the optimality of the model has been realized. An efficient algorithm, Kernel Trick, introduces additional features in the given space. Despite the nonlinear classification boundary, a hyperplane can be used as a classifier without modifying the SVC algorithm. A radial basis kernel function is used in our analysis using a one-versus-all approach.

ANN models are similar to the information flow and decision-making in the nervous system. A neuron is the unit of the ANN system akin to the unit in the nervous system. Each neuron has an activation function that decides the threshold at which a neuron will give output. Several neurons form layers - input, hidden, and output. Actual observations from the input layer move forward through several "intermediate" hidden layers, and the output layer offers the predicted outcome. Learning happens through a readjustment of weights associated with neurons through a feedforward or feedback mechanism. For our ANN – MLP (multilayer multilayer perceptron) analysis, we use fifty neurons with ten hidden layers to mimic human decision-making. Both SVM and ANN-MLP methods have been used in prior literature for addressing important corporate finance issues such as financial distress predictions (Christidis & Gregory, 2010; Charalambakis et al., 2019; Sehgal et al., 2021), credit rating predictions, etc. (West, 2000; Baesens, Setiono, et al. 2003; Hajek, 2012; Hajek & Olej, 2013; Khemakhem & Boujelbene, 2015; Zhao et al., 2015; Addo et al., 2018; Daniel et al., 2019; Wallis et al., 2019).

We use 2/3rd of the data for prediction purposes to train the models and 1/3rd for model prediction. We obtain a Confusion Matrix for all the models that provide actual and predicted cases for informationally dominant firms. The companies are assigned an actual value of 0 for satellite firms and 1 for dominant firms. The actual and predicted values may or may not be congruent for every model. The accuracy rate for any model is determined by estimating a ratio of correctly classified cases to total cases, where a correctly classified case implies the matching of actual and predicted status for a firm. The confusion matrices and accuracy rates for different models are shown in Table 6.

Table 6. Predicting Informational Dominance using the Logit model as well as alternative machine learning approaches

We employ the logit model as well as 3 machine learning approaches namely, random forest, Support vector machine and artificial neural network Multi-layer Perceptron (ANN-MLP) approaches for this purpose. We provide a confusion matrix and accuracy rate based on each method. The accuracy rate is the ratio of correctly predicted cases to total cases and a higher value implies better predictive ability of the given model.

Confusion Matrix		
Binomial Logit Regression		
	Actual	Predicted
	0	1
0	65	43
1	32	51
Accuracy: 0.6073		
Random Forest		
	Actual	Predicted
	0	1
0	85	14
1	12	80
Accuracy: 0.8638743		
SVM		
	Actual	Predicted
	0	1
0	88	37
1	9	57
Accuracy: 0.7591		
ANN		
	Actual	Predicted
	0	1
0	68	29
1	17	77
Accuracy: 0.7591		

Source: Authors' computation

We observe that all the machine learning methods provide higher accuracy than logistic regression. RF provides the highest accuracy level of 86.39% of the three machine learning methods, which is way above the 60.73% provided by logistic regression. Hence, we conclude that machine learning methods are superior to the traditional bi-nominal model for identifying informationally dominant firms. Further, the random forest method is more appropriate for this purpose. Our factor structure, which comprises operational, financial, market, and managerial characteristics, is comprehensive for developing a prediction model. Thus, we conclude that machine learning methods are better at forecasting firm dominance than traditional methods.

Identifying informationally dominant firms vis-à-vis satellite firms may be important, as the former may exhibit different return performance and earnings behaviour compared to the latter. Such differences may have informational content that portfolio managers can exploit to develop investment strategies. We focus on these issues in the following sections.

6. Return Performance of informationally Dominant and satellite firms

After identifying the characteristics of informationally dominant and satellite firms, we next examine the return performance of these firms for the sample period. As seen from the previous section, satellite firms are fundamentally less intense informationally, which is why their chances of misvaluation are high, thus making them more attractive to investors. High investor attention may push up their prices, resulting in lower expected returns (Pandey et al., 2021). Therefore, we expect informationally dominant firms to exhibit higher returns than informationally satellite firms due to greater investor activity in the case of later stocks.

We evaluate if a profitable trading strategy for investors can be created based on these return differentials. Specifically, we construct a notional portfolio that takes long positions in informationally dominant firms and short positions in informationally satellite firms. Our zero-cost portfolio reports an annualized raw return of 1.24% per month (Table 7), which is statistically insignificant at a 5% level. Thus, our dominant firms outperform satellite firms by a small margin.

We provide mean unadjusted returns and Sharpe ratios and CAPM alphas for the informationally dominant and satellite portfolios. We also report mean adjusted returns and CAPM alphas for the zero-cost portfolio which involves taking long positions in dominant stocks and short positions in satellite stocks.

We further examine whether our zero-cost portfolio provides significant risk-adjusted returns. The capital asset pricing model (CAPM) is employed to observe if our zero-cost portfolio provides significant positive alphas. It can be observed from Table 7 that the alpha of our long-short portfolio is positive but not statistically significant at the 5% level. However, informationally dominant stocks outperform satellite stocks by about 1.8% per annum, which may be of economic interest to investors. Besides, when we run the CAPM model separately for dominant and satellite firms, the betas of both groups are close to one. One may recall that our sample of dominant and satellite firms comprises all large companies in each sector, and hence, these groups mimic the market behaviour. Given that there is

Table 7. Returns Performance of Informationally Dominant and Satellite Portfolios

	Dominant Firm Portfolio	Satellite Firm Portfolio	Zero-Cost Portfolio
Panel A: Raw Returns & Sharpe Ratios			
Mean Returns Coefficient	0.0118	0.0108	0.00103
t-Statistic	2.5112	2.1454	0.4531
Sharpe Ratio	0.2563	0.2189	
Panel B: CAPM Based Risk Adjusted Returns			
Alpha Values	0.0064	0.0050	0.0014
t-Statistic	3.4516	2.9411	0.5855
Beta Values	1.0074	1.0883	-0.8089
t-Statistic	27.2721	27.9413	-1.7697

Source: Authors' computation

little difference in their betas, the expected returns are also expected to be not very dissimilar. We conclude that a long investment strategy in informationally dominant large firms pays more than a strategy focussing on informationally satellite large firms.

We further examine the Sharpe ratio for dominant and satellite firms. The Sharpe ratio is estimated by the formula $E(R_P)$-R_f /σp, where $E(R_P)$ and σp are the expected return and standard deviation of return on the portfolio P, and R_f is the risk-free rate of return. A higher Sharpe ratio implies superior risk-adjusted return. In our case, the dominant firm portfolio reports a Sharpe ratio of 0.25, greater than the value of 0.21 observed for satellite firms. Thus, we accept our hypothesis that dominant firms provide better risk-adjusted returns investment opportunities than satellite firms from an Indian investor's perspective.

7. Earnings Behaviour of Informationally dominant and satellite firms

After evaluating the return performance of dominant and satellite firms, we next examine the earnings behavior of these firms. We assess earnings behaviour in two ways: first, by estimating the earnings surprise information, and second, by observing the earnings announcement patterns of dominant and satellite firms.

7.1 Earnings Surprises

In this sub-section, we evaluate the earnings surprises element of dominant and satellite firms, which might help fund managers make investment decisions. Since we have established that dominant firms are fundamentally strong, we assume that their earnings surprise element should be low. Fundamentally strong dominant firms should not have any confirmation bias, and there should not be any window dressing in earnings management for such firms. Therefore, markets should have a fair assessment of their earnings; hence, such firms' surprise element should be low. We estimate each sample firm's quarterly earnings surprise component to test our hypothesis. Earnings surprise is calculated as the difference between the earnings of the current quarter and the average earnings of the last eight quarters divided by the standard deviation of the average last eight quarters. We refer to our earnings surprises as standardized unexpected earnings (sue). Next, we separately estimate the mean earnings surprises for dominant and satellite firms and present our results in Table 8. In conformity with our hypothesis, we find that the earnings surprise element of dominant firms is low compared to satellite firms. However, both are positive and statistically significant at a 5% level. In sum, in conformity with our hypothesis, satellite companies exhibit significantly higher earnings surprises than dominant firms. In the following sub-section, we analyze the announcement patterns of dominant and satellite firms.

Table 8. Mean Earnings surprises for dominant and satellite firms

Mean earnings surprise for a company is estimated using a standardized unexpected earnings (SUE) variable which is defined as (earnings in a quarter – average earnings in the previous eight quarters)/ standard deviation of earnings for the last eight quarters.

	Dominant Firm	Satellite Firm
Mean Value	0.1952	0.2613
t-statistics	3.0489	2.5052

Source: Authors' computation

7.2 Earnings Announcement Pattern

One of the significant information sources for portfolio managers to re-balance their portfolios is the quarterly earnings announcement. Fund managers tend to be careful about the sector exposure in their portfolios and change the weight of a set of companies depending upon the information released about them. It would be interesting for portfolio managers to observe the earnings announcement pattern for the strategic design of their portfolios. Companies announced earlier would help portfolio managers undertake better strategic planning regarding their sector exposures. Portfolio managers generally overweight those companies that have high earnings surprises. Since our results show that dominant firms have low earnings surprises, they may adopt any of the following three strategies for announcing their results. Informationally dominant firms may declare their earnings early as it is one of the most important sources of information, and their dominance may be owing to the early earnings announcement. The contrary view could be that since they have low earnings surprises, they may not announce earnings early, as such a declaration may lead to investment managers underweighting such companies. The third view could be that dominant firms may be leading

because of their fundamental strength and, hence, their earnings announcement patterns may not impair their dominance. Thus, announcement timing may not matter to dominant firms.

To confirm our hypothesis, we analyze the quarterly earnings announcement pattern of dominant and satellite firms of each sector for the sample period. We rank the dominant and satellite companies separately for each sector based on their earnings announcement dates. Both dominant and satellite companies are ranked from 1-10, wherein rank one is held by the company that is first in earnings announcement in that quarter, and rank 10 means the company that announces earnings last in a quarter. Since the firm's dominance has been established on an annual basis (section 3) for all four quarters of a year, we use the same classification for dominant and satellite firms. After ranking securities for sample years, we convert cumulative rankings into percentages to observe their earnings announcement pattern. Finally, we estimate the average percentage of dominant and satellite firms' first and last three rankings and show our results in Table 9.

Table 9. Sector-wise Earnings announcement patterns for dominant and satellite firms

For each sector, we rank the dominant and satellite companies separately based on their earnings announcement dates. Both dominant and satellite companies are ranked from 1-10, wherein rank 1 is held by the company which is first in earnings announcement in that quarter and rank 10 means the company which announces earnings last in a quarter. After ranking securities for sample years, we convert cumulative rankings into percentages to observe their earnings announcement pattern as shown in the table below (all figures in the percentage term).

We do not find any clear pattern in the earnings announcement of dominant firms in sample sectors. We observe that in five sectors, namely Auto, Consumer Durables, Financial Services, FMCG, and realty, dominant firms made early announcements compared to their counterparts. In contrast, in four sectors, i.e., Banks, Media, Oil and Gas, and Pharma, satellite firms were marginally early announcers compared to dominant firms, except for the oil and Gas sector, where this pattern is quite evident. IT and Metal are the two sectors in which we could not decipher any pattern, as both dominant and satellite firms exhibit the same percentage as early announcers. In sum, in 50% of the sectors, our hypothesis gets validated, i.e., dominant firms should be early announcers of earnings

		R1	R2	R3	Avg	R8	R9	R10	Avg
Auto									
	% D	33.33	50.00	47.22	43.52	16.67	16.67	11.11	14.81
	% S	19.44	27.78	8.33	18.52	38.89	47.22	38.89	41.67
	% M	47.22	22.22	44.44	37.96	44.44	36.11	50.00	43.52
Bank									
	% D	5.56	27.78	55.56	29.63	5.56	25.00	5.56	12.04
	% S	69.88	25.00	11.11	33.33	69.44	2.78	13.89	28.70
	% M	80.56	47.22	33.33	37.04	25.00	72.22	80.56	59.26
C Durable									
	% D	38.89	38.89	16.67	31.48	22.22	41.67	16.44	27.78
	% S	19.44	19.44	33.33	24.07	44.44	16.67	8.33	23.15
	% M	41.67	41.67	50.00	44.44	33.33	41.67	72.22	49.07
Fin Services									
	% D	33.33	55.56	61.11	50.00	8.33	8.33	8.33	8.33
	% S	19.44	16.67	16.67	17.59	47.22	16.67	8.33	24.07
	% M	47.22	27.78	22.22	32.41	44.44	75.00	83.33	67.59

		R1	R2	R3	Avg	Oil & Gas	R8	R9	R10	Avg
FMCG										
	% D	38.89	22.22	41.67	34.26	30.56	44.44	22.22	32.41
	% S	22.22	13.89	19.44	18.52	33.33	36.56	52.78	38.89
	% M	38.89	63.89	38.89	47.22	36.11	25.00	25.00	28.70
IT						Pharma				
	% D	55.56	16.67	16.67	29.63	27.78	33.33	13.89	25.00
	% S	22.22	41.67	25.00	29.63	19.44	33.33	25.00	25.93
	% M	22.22	41.67	58.33	40.74	52.78	33.33	61.11	49.07
Media										Realty
	% D	86.11	25.00	44.44	31.19	16.67	19.44	0.00	13.04	
	% S	50.56	52.78	36.11	39.81	47.22	25.00	0.00	24.07	
	% M	19.33	22.22	19.44	29.00	36.11	55.56	100.00	63.89	
Metal										
	% D	52.78	16.67	16.67	28.70	27.78	47.22	19.44	31.48	
	% S	5.56	44.44	33.33	27.78	33.33	19.44	38.56	27.78	
	% M	41.67	38.89	50.00	43.52	38.89	33.33	50.00	40.74	

		R1	R2	R3	Avg	R8	R9	R10	Avg
Oil &. Gas									
	% D	8.33	30.56	33.33	24.07	36.11	25.00	25.00	28.70
	% S	77.78	41.67	15.00	48.15	25.00	25.00	19.44	23.15
	% M	13.89	27.78	41.67	27.78	38.89	50.00	55.56	48.15
Pharma									
	% D	25.00	44.44	25.00	31.48	41.67	13.89	30.56	28.70
	% S	41.67	27.78	38.89	36.11	25.00	44.44	22.22	30.56
	% M	33.33	27.78	36.11	32.41	33.33	41.67	47.22	40.74
Realty									
	% D	11.11	22.22	47.22	26.85	16.67	27.78	19.44	21.30
	% S	19.89	11.11	16.67	18.89	38.89	16.56	52.78	36.56
	% M	75.00	66.67	36.11	59.26	25.00	16.67	27.78	28.15

Source: Authors' computation

compared to satellite firms. For the remaining sectors, we could not find clear patterns, barring Oil and gas, where a clear pattern of contrary results was found. Thus, all three perspectives we hypothesized could be seen in the announcement pattern of dominant firms. Hence, investment managers using earnings announcements as an information source must develop sector-specific trading strategies, given that our study observes different earnings announcement patterns for different sectors.

8. Conclusion, Implications and Future Research

We conduct the present study to identify informationally dominant and satellite firms for 11 major sectors in the Indian economy. We observe that informationally dominant firms exhibit positive return and risk spillovers, while the satellite firms exhibit negative spillovers, implying that they are net receptors of information. We also find that informationally dominant firms are fundamentally stronger than satellite firms as they exhibit better operating, financial, and market characteristics. Further machine learning approaches like the Random Forest Method do a better job than other machine learning models and classical binomial logit models for predicting firm dominance. We further find that informationally dominant firms provide an annualized risk-adjusted return of 7.8%, 1.8% higher than those reported by satellite firms. This return differential may be of economic consequence as our dominant and satellite firms are all large companies in each sector. It is also observed that dominant firms exhibit fewer earnings surprises than satellite firms. Finally, we find that dominant firms do not follow earnings announcement patterns, distinguishing them from satellite firms, as the results for different sectors provide a mixed picture. Specifically, earnings announcement patterns vary for different sectors. Hence, there is a possibility that some sector-level factors may account for these variations, and this issue needs to be explored in further research.

The study fundamentally contributes to corporate finance literature by suggesting a new approach to firm dominance. The existing literature on firm dominance emphasizes dominance from the perspective of consumers. However, another important dimension of firm dominance is from the viewpoint of investors who want to look at this issue from a return and risk perspective. Moreover, investment decisions are made based on stock price characteristics. Hence, the novelty of our idea to examine firm dominance and our results have important implications for investment managers.

The research provides several managerial implications. Corporate managers, investors, and regulators can use our theoretical framework to define dominant firms as those that play a relatively more important role in a particular sector's return and risk determination process. Since informationally dominant firms are fundamentally strong, their corporate finance managers should find it easier to raise funds at a relatively lower cost of capital. From investors' perspective, informationally dominant firms provide better risk-adjusted returns and hence have implications for portfolio construction. The regulators need to keep the firms' monopolistic tendencies under check. For this, they need to focus on product market dominance and examine financial market informational dominance. The latter may vest the firms with controlling power, leading to price manipulations. The study contributes to India's strategic corporate finance and trading strategy literature for India, which is the fastest-growing large economy.

We acknowledge that the findings of our study may be relevant only in the Indian context and for select sectors. Further research is warranted on the subject using a wide range of sectors and industry groups for mature and emerging markets before one derives any universal conclusions. Industry-level factors like concentration level, state of technology and potential disruptions, entry and barrier conditions, regulatory and policy frameworks, etc., should be incorporated in future work. Such an approach shall provide greater insight into why informationally dominant firms exhibit different return and earnings behaviour across sectors.

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Understanding the Affective Commitment of IT Employees: New Evidence for the Proactive Role of Psychological Capital

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Abstract

The Indian IT sector's role as a strategic GDP contributor is well appreciated. However, this sector is marked by acute attrition levels that negatively impact its growth and development. Although this has been identified in the literature as a pertinent issue, scarce attention has been garnered to identify resources to check this trend. The drive of the current paper is to review recent research into the association between Affective Commitment (sub-component of Organizational Commitment) and Psychological Capital. The current inquiry explores and attempts to comprehend the contribution of Psychological Capital in building Affective Commitment. The sampled data comprises 224 employees from IT concerns from Delhi-NCR. Empirical investigations were conducted using SEM. An EFA, followed by CFA and Path Analysis, exhibited a robust association between Psychological Capital and Affective Commitment. The study's findings present an approach to fostering employees' positive mindset and psychological well-being to increase their commitment to or attachment to the organisation. Managers are encouraged to leverage this finding by emphasising employees' positive psychology to strengthen their organisational commitment. The paper also proposes implications and subsequent research directions in the field of Psychological Capital and Affective Commitment.

Keywords: *Organizational Commitment; Affective Commitment; Psychological Capital; Attrition; SEM; IT employees*

1. Introduction

As the princely-valued and dominant driver of GDP, Indian Information Technology takes centre stage in India's growth parameters. According to the NASSCOM report (2022), the IT and the BPO industry witnessed a growth of 17% and 13.5%, respectively, in the financial year 2022. Software products were the fastest-growing segment at 19%. Kumar (2019) found that "The transformation has been phenomenal with India emerging as the world leader in information technology and business outsourcing". However, despite the lucrative numbers, attrition has always been a buzzword in this sector (Pallathadka et al., 2022). The authors further advocated that the paramount loss of the employees would negatively impact the organisation's growth, including the plummeting financial records. Further, the onslaught of Covid-19 worsened the already chronic issue. Interestingly, in 2021, Xpheno found that the IT sector would face acute attrition (1.15 million). A report in 2022 published in the 'The Hindu' newspaper found that several were quitting their jobs, creating a surge in attrition. This would eventually lead to a huge supply-demand imbalance as enterprises fail to meet their talent requirements.

Retention/turnover was the top workforce management challenge cited by 47% of HR professionals in the SHRM/Global workforce survey. As SHRM proposes, “Managing for employee retention involves strategic actions to keep employees motivated and focused so they elect to remain employed and fully productive for the benefit of the organisation.” One probable reason cited by SHRM was a lack of organisational commitment. Nevertheless, it becomes pertinent for the firm to explore the reasons behind the lack of commitment (Olubiyi et al., 2019).

The Conservation of Resources (COR) theory suggests that individuals tend to hold on to essential resources (Hobfoll, 1989). Under the lens of the COR theory, Psychological Capital is perceived as a significant personal resource that employees endeavour to maintain and develop. With higher Psychological Capital, the employees perceive a longer association with their existing organisation. Literature is essential to the association between Psychological Capital and affective commitment (Ribeiro et al., 2021). Despite its overgrowing importance, this association has been very scantily investigated.

Given the above evidence, an insight into the factors that check this trend can be worthwhile. Carucci (2021), in the HBR edition, commented that “the top two reasons employees cited for leaving (or considering leaving) were that they didn't feel their work was valued by the organisation (54%) or that they lacked a sense of belonging at work (51%)." Given the strength of the positive psychology movement for creating the commitment necessary for productive organisations, a study to understand the same can be insightful. Seismic research has been conducted on Psychological Capital and its contribution towards desirable workplace outcomes.

Therefore, the current investigation will examine the proactive role of psychological capital in building organisational commitment for Indian IT organisations. There seems to be a massive gap in the investigation literature, including psychological capital and organisational commitment. Moreover, notwithstanding its significant contribution, very scant studies have been undertaken on organisational subtleties in India compared to its Western counterpart (Budhwar & Sparrow, 2002; Budhwar et al., 2006). Fewer investigations have been conducted separately on organisational commitment and psychological capital, but very scant investigations include samples from the Indian IT sector. Overall, the paper addresses critical issues like organisational commitment in Indian IT Organizations.

The paper is divided into sections. The opening section includes an introduction to the study. The second section consists of a review of the literature. The third section mentions objectives. The fourth segment covers the study rationale. The fifth section explains the methodology. The sixth section describes the analysis done in the paper. The seventh section includes a discussion. The eighth segment deals with management insinuations, followed by limitations and future research in the ninth section. The paper concludes with the conclusion in the tenth section.

2. Review of Literature

2.1 Psychological Capital

Psychological Capital is inspired by positive psychology. Imbibing a scientific approach has been a matter of keen interest (Newman et al., 2014). Psychological Capital is a core concept embracing HERO (hope, efficacy, resilience and optimism) dimensions, which enjoy exclusive features and synergistic status (Luthans & Youssef-Morgan, 2017). It is defined as "an individual's positive psychological state of development that is characterised by: (1) having confidence (efficacy) to take on and put in the necessary effort to

succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and when necessary, redirecting paths to goals (hope) to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success" (Luthans & Youssef-Morgan, 2017, p. 340).

Psychological Capital has four dimensions: hope, efficacy, resilience, and optimism. Hope is defined as "a positive motivational state based on an interactively derived sense of successful (a) agency (goal-directed energy) and (b) pathways (planning to meet goals)" (Snyder et al., 1991, p. 287). Efficacy means "the individual's conviction or confidence about his or her abilities to mobilise the motivation, cognitive resources or courses of action needed to execute a specific task within a given context successfully" (Stajkovic & Luthans, 1998, p. 66). resilience is "the capacity to rebound or bounce back from adversity, conflict, failure or even positive events, progress and increased responsibility" (Luthans, 2002, p. 702). Optimism is a positive expounding technique that assigns positive actions to particular, constant, and ubiquitous begins and infers adverse events as external, transitory, and situations-specific factors.

Literature supports its development through longitudinal and experimental studies (Demerouti et al., 2011; Ertosun et al., 2015). It concerns what a person is and what he/she can become. It goes beyond the social and human capital concepts which answer 'who you know' and 'what you know' respectively (Newman et al., 2014, p. S121). It is significantly related to organisational and employee outcomes like job satisfaction, employee behaviour, attitudes, performance, etc. (Nolzen, 2018). Nurturing positive relationships reassures constructive discourse, from exchanging ideas to giving feedback on performance. It can be a desirable psychological capacity primary to people's motivation and intellectual processes while facing work challenges. Such competencies include a belief in self-confidence to try to achieve challenging tasks; having positive energy in tackling problematic situations, considering hostile events as an outcome of external effects, discrepancies related to explicit factors, and almost always looking for alternate ways to attain goalmouths; and able to recover from hardship and failure, tenacious during conflict and ambiguity, even stress due to factors like increased responsibility (Culbertson et al., 2010; Avey et al., 2011; Jung & Yoon, 2015; Pillay et al., 2020). As a positive resource, it further ensures a constructive impact on workplace activities, like job performance, helps to fight stress, and also plummet undesirable behaviours (Hsu et al., 2014).

2.2 Organisational Commitment

Organisational commitment is a person's emotional connection with an association that reduces the probability that the personnel will quit their jobs (Meyer & Allen, 1991). They developed a highly cited three-dimensional model of organisational commitment, encompassing affective, continuance and normative commitment. Workers' emotional connection to and identification with their workplace is the employee's affective commitment. Continuance commitment concerns the apparent costs of continuing or quitting an organisation. Normative commitment echoes workers' inner call for duty to their organisation. They want to remain in their organisation (Marsh & Mannari, 1977). The current inquiry has taken affective commitment, a sub-component of organisational commitment, to understand its role in checking the issue under consideration.

The need for committed employees eager to participate in organisational development is essential (Singh & Mohanty, 2011). Agrawal (2015) listed commitment as a factor that may impact attrition. Employees' commitment level is related to several desirable outcomes like reducing turnover intention, punctuality, supporting organisational performance, organisational citizenship behaviour, and manageable absence from office (Meyer et al., 1989; Coyle-Shapiro & Kessler, 2000; Dishon-Berkovits & Koslowsky, 2002; Mathieu et al., 2016; Schulz et al., 2014; Wei et al., 2016). Several inquiries propose that employees' strong commitment towards their organisations excel under dynamic circumstances and contexts (Lumley et al., 2011). Hence, it is probable to believe that establishments that lure and retain talent are inclined to be more efficient and successful. Further, this enforces work stability and reduces costs. Thus, an urgent need is felt to find various means of enhancing employee commitment, especially in IT sector employees.

2.3 Organisational Commitment and Psychological Capital

Evidence from the literature has found that Psychological Capital leads to desirable higher employee commitment to their organisation's mission with a positive intent to stay (Luthans & Jensen, 2005). Understanding Psychological Capital (Luthans & Jensen, 2005) can open new avenues for

addressing the issue of employee commitment and attrition. Several studies, including meta-analysis, found it to be a significant antecedent of commitment apart from other looked-for organisational consequences (Lyons et al., 2006; Diržyt et al., 2013). A scant but upcoming body of literature has investigated this association and reported its positive correlation. In a meta-analysis, Avey et al. (2011) stated a positive association between Psychological Capital and appropriate worker mindsets, including psychological well-being, job satisfaction, and organisational commitment. Another meta-analytic approach by Wu (2019) found organisational commitment as a consequence of Psychological Capital.

With an internal locus of control and optimistic attributes, such workers are loyal, confident, and assets to their organisations (Larson & Luthans, 2006). Likewise, persistent employees, in their quest for goal achievement, will have higher motivation in accomplishing organisational tasks (Luthans, 2002). Hence, an organisation can have a loyal and committed people force (Aminikhah et al., 2016; Simons & Buitendach, 2013).

Recent research confirms that higher psychological Capital boosts affective commitment, engagement, and perceived organisational support (Loghman et al., 2023). Ribeiro et al. (2021) emphasise the dynamic nature of Psychological Capital and found that Psychological Capital can be strengthened through targeted organisational interventions such as resilience training, supervisor support and empathy, which subsequently deepen affective commitment. While most studies considered Psychological Capital as a precursor of affective commitment, Akçin (2023) suggests a reciprocal relationship where emotional attachment can further enhance psychological resources. Technological development and advancement have introduced Artificial Intelligence and Analytics-based interventions, which significantly foster Psychological Capital at both individual and team levels (Jeremias et al., 2024; Kadiyono & Pardosi, 2023). In addition, scholars have recognised the significance of psychological Capital more at the team level than the individual level, and it strongly influences collective affective commitment and other HR interventions (Waseem, 2025).

Hence, the above evidence suggests that Psychological Capital is positively associated with an organisational commitment to reducing attrition in the Indian IT sector.

3. Objective

This study aims to empirically investigate the relation between Psychological Capital and Affective Commitment (a sub-component of Organizational Commitment).

4. Rationale of the Study

IT sector, enjoying an essential place in India's GDP and employing a significant percentage of the population, needs renewed importance in literature. Factors that try to destabilise its growth need to be better handled. In line with several inquiries conducted on Psychological Capital and its contribution towards desirable workplace outcomes, the present study for understanding its role in building commitment can be meaningful. The IT sector employs about 2.5 million people; hence, understanding the work culture promoting commitment can be interesting (NASSCOM report). In their meta-analysis, Imam and colleagues (2017) reported that psychological capital research focused more on developed and a few developing countries. They advocated more studies in Asian countries. As a phenomenon, Psychological Capital research has not been undertaken much in the Indian sub-continent. Further, Raukko (2009) advocated for more research to examine the organisational commitment of IT employees.

5. Methodology

The paper has conducted empirical investigations using structural equation modelling (SEM). The following paragraphs include details for the empirical investigations of the study.

5.1 Research Design

The research design includes a causal cum descriptive design. Descriptive and inferential research was utilised to test the hypothesis. The present research study is causal as it has tested the cause-and-effect relationship between the study variables. The study includes Psychological Capital as the independent variable and Affective Commitment as the dependent variable.

5.2 Participants and Procedure

Three hundred fifty participants from fifteen IT organisations were sent questionnaires as soft and hard copies. The companies were selected from the top 100 performers from India (https://www.dqindia.com/dq-top20-meet-indias-top-100-it-companies/). Completed

questionnaires were received from 224 participants.). Of the respondents, males accounted for 63% (N=141), and females accounted for 37% (N=83). The sampled data had 49.3% graduates, 46.3% post-graduates, 3% PhD holders, and 1.4% in the "other" category. Table 1 includes the participants' profiles. To alleviate response bias and non-responses, the potential participants were assured that there would be no link to their or their organisation's identity and that the purpose of the data collection was purely academic.

Table 1. Respondents' Demographic Profile

Variable		N	Percentage %
Gender			
	Female	83	37
	Male	141	63
	Total	224	
Age			
	<20	9	4
	20-30	86	38
	30-40	87	39
	40-50	24	11
	50-60	18	8
Income			
	<40,000	24	11
	40,000-60,000	62	28
	60,000-80,000	56	25
	>80,000	82	36

Source: Authors

5.2 Measures

Psychological Capital

To measure psychological Capital, the study adopted the PCQ (12) scale (Avey et al., 2011). It comprises 12 items capturing the HERO dimensions. The participants were asked to respond with a 7-point Likert scale from (1) strongly disagree to (7) strongly agree. Sample items for each sub-scale included the following: “I can think of many ways to reach my current work goals (hope); “I feel confident presenting information to a group of colleagues (efficacy)”; “I usually take stressful things at work in stride (Resilience)”; “I always look on the bright side of things regarding my job (optimism).”

Organisational Commitment

Six items capturing its sub-component, Affective Commitment, have been taken from the 18-item scale of Meyer and Allen (1991) to measure organisational commitment, as it best explained the sampled data.

5.3 Control Variables

Age, income, gender, education qualifications and job experience were controlled for the present study.

6. Analysis

The current investigations have utilised structural equation modelling (SEM), which is strongly advocated by Luthans and Youssef-Morgan (2017) because it adds more rigour and accuracy when the analysis includes multidimensional constructs.

6.1 Procedure for Data Analysis: Conducting Exploratory Factor Analysis for Factor Recognition

Exploratory factor analysis (EFA) is vital in social sciences research (Hu & Bentler, 1999). As in the process, it is crucial to test the suitability of the dataset before it is subjected to any statistical investigations. The factor analysis began with determining the appropriateness of the sample size. The current sample size is 224 for factor analysis, which aligns with MacCallum et al.'s suggestion (1999). It was followed by conducting a Kaiser-Meyer-Olkin measure of adequacy. It is performed to see if the items correlate passably for factor analysis. Its minimum level is 0.60 (Tabachnick et al., 2007). The sampled data had KMO values of 0.79. Thereafter, Bartlett's test of sphericity was used to examine the significance of the correlation matrix. The results were significant ($p<0.05$).

6.2 Reliability Analysis

A reliability investigation was performed to examine the internal constancy of the factors. Cronbach's alpha is used to determine if items relating to every factor fit theoretically (Nunnally, 1975). The adequate Cronbach's alpha values have to be >0.7. All the factors had their Cronbach's alpha values >0.7, thus indicating a very high reliability (Hair et al., 2020). The scale's overall alpha reliability was 0.851. Table 2 gives the bivariate correlations and Cronbach's alpha of the study variables.

Table 2. Bivariate correlations between the study variables with their Cronbach's alpha reliabilities on the diagonal

	Hope	Efficacy	Resilience	Optimism	Psy Cap	Affective	
Hope	1	**0.757**					
Efficacy	.441**	1	**0.784**				
Resilience	.391**	.188**	1	**0.728**			
Optimism	.367**	.362**	.271**	1	**0.758**		
PsyCap	.786**	.666**	.619**	.611**	1		
						0.825	
Affective	.366**	.312**	.210**	.267**	.625**	1	**0.797**

***Correlation is significant at the 0.01 level (2 -tailed).*
Affective: Affective Commitment; Psy Cap: Psychological Capital
(Source: Authors)

6.3 Missing Values and Normality check

Out of a total of 350 questionnaires sent, 266 responses were received. Forty-two responses had to be removed from the analysis due to missing values and unengaged responses. Data was checked for normality through univariate skewness and kurtosis indices. As Kline and colleagues (2012) recommended, the permissible limits for kurtosis are between +10 and -10. Skewness should be within the range of +3 and -3. The skewness values for the present study were between 0.492 and 1.598, and the kurtosis values were between .366 and 3.346 (Teo et al., 2009). The data was put for further analysis because the values were within the permissible limits.

The EFA found five factors explaining 67.80% of the variance together. The factors extracted had Guttman-Kaiser eigenvalue higher-than-one rule (K1 rule). The present study included items with a factor loading of more than 0.5. Factor renaming was not required as all matched literature. The first factor (Affective Commitment) had four items and explained the highest 31.267 % of the variance. It was labelled as "AFF". The second factor (Hope) had three items and explained 12.004 % of the variance. It was labelled as "HO". The third factor (Efficacy) had six items and explained 10.225 % of the variance. It was labelled as "EFF". The fourth factor (Resilience) had three items and explicated 7.756 % of the variance. It was labelled as "RES". Lastly, the fifth factor (Optimism) had two items and explained 6.730 % of the variance. It was labelled as "OPT". Although it is preferred to have a three-item or above construct, several studies have adopted a two-item construct (Ho & Lin, 2010; Lin & Hsieh, 2011; Martins et al., 2014). This was further confirmed by checking the psychometric properties of the construct. Table 3 gives the details of EFA.

6.4 Conducting confirmatory factor analysis, instrument finalisation and reliability

The basic purpose of performing a CFA is to inspect if a second-order ethical risk factor occurs. CFA was executed using IBM SPSS AMOS 20 software to test the reliability and validity of the study constructs (Anderson & Gerbing, 1988). SEM is recommended for psychological capital empirical analysis in the literature as it improves the result (Dawkins et al., 2015). An ideal sample size for factor analysis depends upon the complexity of its measurement model. It should be between 200 and 400 (MacCallum et al., 1996). The present sample size is 224, which is within permissible limits. Maximum Likelihood Estimation (MLE) method was used for model estimation.

6.5 Validity

Cohen and colleagues (1997) describe validity as assessing how well a test measures its intended purpose.

6.6 Convergent Validity

Convergent Validity discusses the degree to which numerous measures of a construct approve of one another (O'Leary-Kelly & Vokurka, 1998). Three conditions must be fulfilled for determining it (Hair et al., 2020). The first condition is that the average variance extracted (AVE) must be above

Rotated Component Matrix					
	Component				
	1	2	3	4	5
AC3	.788				
AC5	.766				
AC4	.742				
AC6	.730				
AC2	.723				
AC1	.701				
H3		.788			
H2		.783			
H4		.761			
H1		.631			
PE5			.813		
PE7			.781		
PE6			.756		
R9				.862	
R10				.800	
R8				.583	
O11					.835
O12					.832

Source: Authors

0.50 for every construct. Secondly, composite reliability (CR) should be more than 0.70 and third CR > AVE. Third, composite reliability should be above 0.7. All items had estimates that were well within the acceptable range, thus finding adequate reliability and validity.

6.7 Discriminant Validity

Discriminant validity means the extent to which measures of diverse constructs are dissimilar (Campbell & Fiske, 1959). Two conditions must be satisfied (Fornell & Larcker, 1981). The first requires that the construct's AVE be above the maximum shared variance (MSV) between a construct in the given model. Secondly, the AVE's square root must be more than the inter-construct correlations in the given model. Both the conditions were duly satisfied.

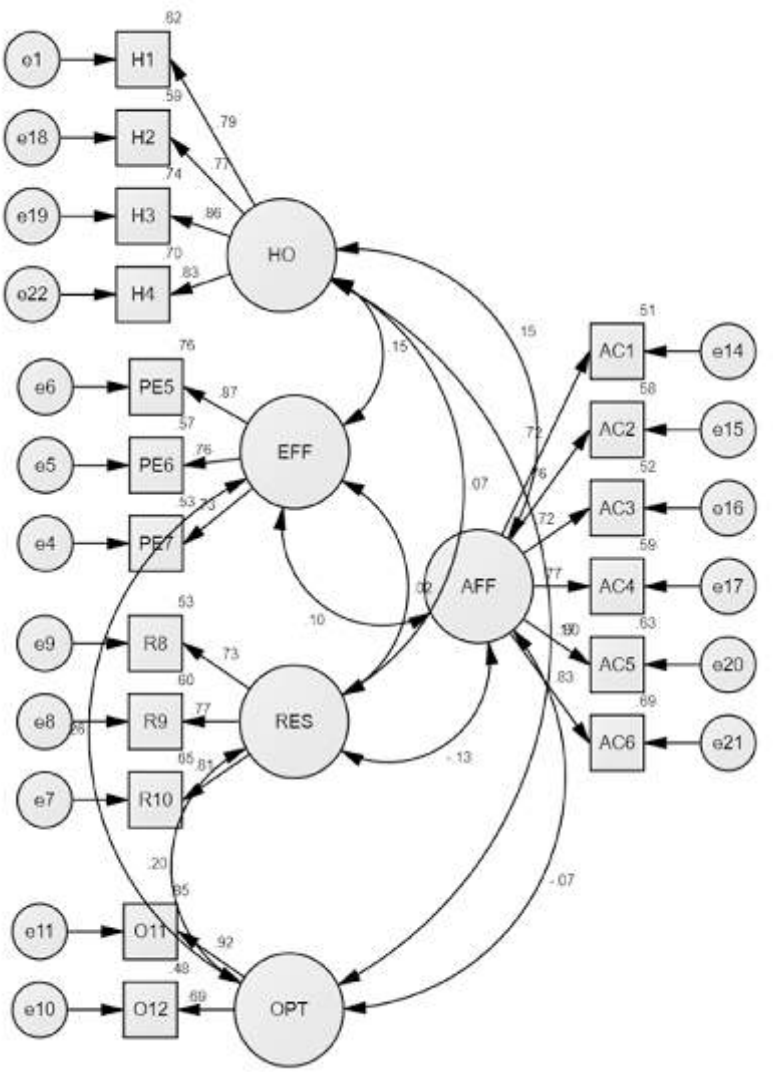
6.8 Common-method and single-source biases

Biases like common-method and single-source are often found in cross-sectional inquiries (Podsakoff et al., 2003). Hence, Harman's single-factor test was performed. Only 31.26% of the total variance was explicated by a single factor, which was less than the prescribed norm of 50%. Moreover, an investigation using the standard latent factor method in AMOS was also conducted. The results showed a

poorly fitted model (CMIN/df = 6.352, p = 0.000, GFI = .753, CFI = 0.574, RMSEA = 0.155). Therefore, these two biases can be implausible.

6.9 Measurement Model for Model Fit Estimation

As a common practice in research, the instrument's model fit was examined using model fit indices as given in SPSS and AMOS using a fit index. Three goodness of fit indices, comparative fit indices (CFI) >0.90, the goodness of fit index (GFI) with value >0.90, adjusted goodness of fit index (AGFI) >0.80, root mean error of approximation (RMSEA) value of £ 0.05 and CMIN/df (normed chi-square) with a ratio of less than 3.00 or lower (Bentler, 1990) were used to determine the model fit. Results for the present model had CFI equal to 0.98, GFI equal to 0.93, AGFI equal to 0.91, CMIN/df values equal to 1.061, and RMSEA equal to 0.017. The fit indices values are significant (Obadia & Vida, 2011), so the present model exhibits a good fit. Further, the present default model indices converged more with the saturated model indices than the autonomous model (AMOS output). Figure 1 gives the AMOS output of the measurement model, showing the standardised factor loadings.



Source: Authors

Figure 1. Measurement Model of Psychological Capital's Dimensions

6.1 Structural Model

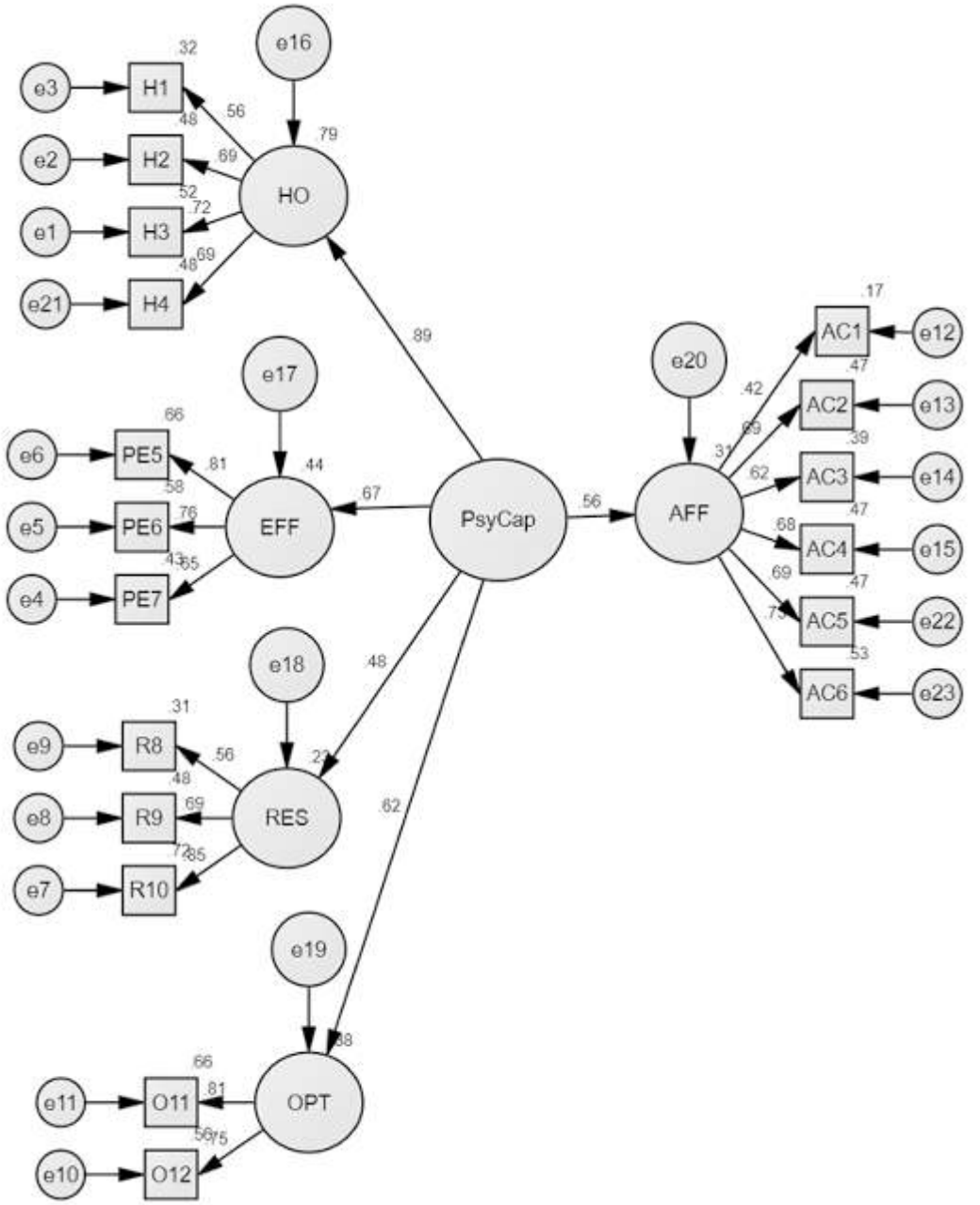
The standardised path coefficient results in Figure 2 (structural model) show that Psychological Capital enjoys an optimistic association with Affective Commitment, a sub-division of Organizational Capital ($\beta = 0.56$, $t = 3.879$, $p<0.5$). This result shows that Affective Commitment is increased and is promoted when individuals imbibe positive psychology through Psychological Capital. The present analysis found a positive association between Psychological Capital and Affective Commitment. This corroborates with the findings of Jaros (1997), who reported that of all the three divisions of organisational commitment that were significantly and negatively related to job quit, affective commitment was found to be the sturdiest antecedent of all. Several researchers have found affective commitment as a single measure of organisational commitment (Lee & Bruvold, 2003; Joarder et al., 2011). Brett and colleagues (1995) found affective commitment to be a substantial antecedent to individual performance. Further, affective commitment is the most researched component (Field & Buitendach, 2011) and is correlated with positive outcomes (Simons & Buitendach, 2013; Wasti, 2003). In their empirical investigations on IT employees, Cho and Huang (2012) stated that it was more significant than the other two sub-parts of organisational commitment in plummeting the intent to resign for proficient progression.

The results also align with several authors (Luthans et al., 2008; Cetin, 2011) who reported that higher psychological capital can lead to better organisational commitment. Employees are considered productive when their behaviours and actions go beyond organisational goals (Motowildo et al.,1977). Further literature specifies that turnover intention negatively correlates to organisational commitment (Aydogdu & Asikgil, 2010; Hussain & Asif, 2012; Tirelli & Goh, 2015). Therefore, it is quite viable to believe that employees with high affective commitment towards their organisation would exhibit high performance yet maintain their association with it. Consequently, workers who commit to their establishments are likely to quit their jobs (Hsiao et al., 2020; Vandenberghe et al., 2017).

Our findings contribute to the growing body of Psychological Capital research. By promoting and building positive psychology through Psychological Capital, the employees can develop their willingness to join their organisation. Uraon (2017), through his empirical investigations, has stressed the importance of HRD interventions for controlling attrition in the software industries. Hence, organisations can check the growing attrition levels in their organisations. The current results strongly suggest using Psychological Capital as a positive resource for developing employee Affective Commitment. Psychological Capital emphasises the constructive fortes of persons. It creates positivity by providing the necessary effort, realising goals, acting resilient while facing challenges, and sustaining a progressively optimistic outlook. Organisations may look for interventions to help develop this profound positive resource for organisational members. It can check for negative behaviours like lack of loyalty and commitment. As advocated by Benette and Durkin (2000), employees with higher commitment can have positive outcomes such as heightened levels of motivation, job satisfaction, and regularity in work. It is also beneficial in checking absenteeism and turnover.

7. Discussion

Comparison of the findings with those of other studies confirms the study objective, which was to explore and understand the association between organisational commitment and Psychological Capital. The overall findings indicate a positive and significant association between these two variables: organisational commitment and Psychological Capital. Descriptive statistics results were calculated and analysed. The mean and standard deviation findings are in line with prior studies. To inspect the correlation between Psychological Capital and organisational commitment for a dataset of 224 Indian IT employees, an EFA, CFA and path analysis were performed. The EFA resulted in 5 factors and explained 67.80% of the variance together. In the CFA, the sampled data was confirmed to have acceptable convergent and discriminant reliability. Further, the model fit indices were found to be significant and under the standard permissible limits as specified in the literature. The analysis concluded in path analysis where the path amid Psychological Capital and organisational commitment was positive and significant ($\beta = 0.56$, $t = 3.879$, $p<0.5$). This study supports evidence from previous observations that found a positive relationship between Psychological Capital and organisational commitment (Luthans et al., 2005; Peng et al., 2013; Rego et al., 2016; Shukla & Rai, 2015; Sahoo & Sia, 2015; Tang et al., 2019; Chen et al., 2021; Ribeiro et al., 2021). However, the study does not corroborate the findings of Shahnawaz and Jafri (2009) and Idris and Manganaro (2017), who reported that Psychological Capital could not envisage organisational commitment.



Source: Authors

Figure 2. Structural Model

8. Managerial Implications

The contemporary workplace is swathed in downsizing apprehensions, lack of job security, and disruptive technological changes. Further resource constraints continue to bother organisations, leading to distress. One cannot be thus oblivion to a need to create a positive and constructive culture enamoured by positivity and vitality. Such small interventions would lead to a spiral effect that will touch upon the commitment of all the organisational participants. A study by the SHRM stated that by 2022, employee retention will be HR's dominant challenge. Youssef and Luthans (2007) have asserted that when aptitude turns out to be rare, it is domineering for establishments to retain such a workforce. Knowledge and skills owned by the employees contribute to the performance, which becomes more profound when the employees are eager and able to achieve it (Luthans et al., 2017). Psychological Capital enjoys a worldwide accepted positive correlation with desirable organisational consequences (Luthans & Youssef-Morgan, 2017). The current scenario calls for more positive interventions that can appreciate individual and subjective drivers and outcomes, apart from the economic end of the employees. The disruptive realities of today's organisations mandate interventions with positive psychology that offset the unwanted and negative impact of events and happenings. Productivity and growth are essential, but they cannot be achieved without positive workforces who would not leave their organisations for incorrect reasons.

Many unpleasant scenarios can be avoided if the participants can communicate what they want. For example, when a dysfunctional conflict arises in the organisation, it becomes pertinent for the supervisor to act. By being efficacious in performing their duties, optimistic about a fair relationship, resilient in handling a negative situation, and hopeful of encouraging better performance, they can show significant balance in their acts. The synergistic power of this framework can help build a positive, productive organisational culture. Further, authors (Wright & Hobfoll, 2004) explicitly explained that the attempt to acquire, retain and maintain significant resources is to meet employment demands and support the sustainability of possessing such resources. Hence, it is reasonable to believe that people with psychological Capital will experience positive emotions that will be used towards their jobs, thereby increasing affective commitment. The management may use this resource to inculcate a culture that promotes a positive work environment. By solidifying trust (through Psychological Capital), personnel may be more likely to work through and stay committed during challenging times, plummeting the probabilities of voluntary turnover and allied costs. An organisation incorporating positive psychology through Psychological Capital can grow exponentially and become the most wanted organisation to work with. It can be a positive resource for countering negative behaviours in organisations.

To reduce attrition, organisations are urged to invest in programs and policies that can enhance the Psychological Capital of their employees. Initiatives such as nurturing hope through career pathways, building efficacy with skill development programs, enhancing resilience via training and development and promoting optimism through a strong feedback system nourishing positive psychological resources. This can have the long-lasting appeal of creating a culture of trust (Zaayman & Motala, 2024) and work engagement (Subramani et al., 2024) among their employees. Management should accentuate the preparation of psychological capital interventions and training to gain a sustainable competitive advantage (Goswami et al., 2024). Such HRD interventions would ultimately check its attrition rates by creating affective commitment towards the organisations.

9. Limitations and Future Research Recommendations

For the quantitative study, data was collected from one sector (IT) only at once. However, an attempt was made to collect the same from different organisations. However, a single industry can act as an obstruction for generalizability. It would be interesting if future research were conducted on organisations that correspond to other sectors. Moreover, further investigations can include samples from different contextual backgrounds. This may add further robustness to the study. Moreover, future research can collect and collate data at various time intervals to draw a fundamental understanding of the study variables. Using longitudinal research design in future research can help eliminate causality errors. It can help to capture more data points. The following limitation is that the questionnaires were self-reporting in nature. The participants may not have generated correct responses. Further, issues corresponding to social desirability are a very valid possibility. This may result in over or under-reporting of good or bad behaviour.

10. Conclusion

The current inquiry provided a vital insight into understanding the resources that can help build employees'

strong commitment towards their organisations. The literature says change is inevitable in establishments (Aujla & Mclarney, 2000). The current scenario calls for more positive psychology interventions that can hugely appreciate individual and subjective drivers and outcomes, apart from the economic end of the employees. Zeraatkar et al. (2020) have advocated more attention to a company's lifeline and its employees. They strongly call for more interventions that build organisational competencies. In this regard, organisational commitment is an essential pillar for the excellence and growth of the organisation. The present paper makes a significant contribution to the literature. Very few investigations to our knowledge have undertaken an attempt to examine the relationship between Psychological Capital and affective commitment in the Indian IT sector. As an IT hub of the world, India must include interventions that promote positive resources for its employees. Understanding the link between psychological capital and affective commitment will help tackle attrition in this sector. The disruptive realities of today's organisations mandate interventions with positive psychology that offset the unwanted and negative impact of events and happenings. In line with the suggestions given by the originators of the Psychological Capital framework (Luthans & Youssef-Morgan, 2007) and their colleagues (Dawkins et al., 2015), the quantitative investigations were conducted using SEM. As anticipated, the Psychological Capital resource enjoyed a positive association with Affective Commitment (a sub-division of Organizational Commitment).

An employee with affective commitment has strong reasons to be identified with the administration's goals. They have an inner desire to continue with their present organisation. There is scarce research and thoughtful interferences on how HRD practitioners can develop employees with positive work attitudes, like higher commitment levels. Apposite human resource management and development guidelines can be framed and incorporated to ensure positivity in the workplace. Employees with higher levels of these capacities can be better performers. It prepares an individual with a positive drive to witness all matters positively. Hence, by developing an employee's psychological Capital, there are robust chances of a flagship organisation that may top the list of the most wanted organisations to work with.

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Mental Wellbeing in Healthcare Sector: A Social Support Perspective

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Abstract

This research is aimed at measuring the impact of intimate loneliness, collective loneliness, and relational loneliness on anxiety and depression among healthcare employees (HCEs) during a crisis-induced pandemic. Drawing on the social support theory, this study utilizes the standard scales- UCLA, GAD-7, and PHQ-9- to measure loneliness, anxiety, and depression. A questionnaire survey was administered to 150 nurses and physicians employed in hospitals. Regression analyses were performed using SPSS to examine the relationships. Collective loneliness emerged as a significant predictor of anxiety and depression. Moreover, the mean scores for the first-order constructs indicate the highest prevalence of collective loneliness along with mild anxiety and moderate depression, respectively, among healthcare employees. Although past research has studied the link between loneliness and mental health, the authors believe that the findings are a significant effort to understand the specific role of collective loneliness in predicting anxiety and depression for healthcare workers. The findings will help human resource professionals enhance the mental wellbeing of healthcare employees by fostering robust social support mechanisms, orchestrating team-oriented initiatives, and fortifying interpersonal networks. Modern managers can address mental health pressures through strategies like extending emotional support, offering constructive feedback, individual or group counselling sessions, skill workshops, hotlines, social networks, and burnout leaves.

Keywords*: Loneliness, Anxiety, Depression, Mental Health, Healthcare Employees (HCEs), Social Support*

1. Introduction

Medicine is one of the loneliest professions. Extant literature on mental health suggests that healthcare employees are particularly susceptible to conditions such as depression and anxiety due to their frontline role in combating pandemics, making them more prone to suicidal tendencies. According to Taylor (2019), pandemics are situations where the psychological responses of the populace to infection are crucial for the disease's spread and containment, as well as determining the degree of widespread emotional distress and social disorder. The spread of the coronavirus pandemic and the uncertainty surrounding it have been linked to elevated levels of anxiety and other mental disorders (da Silva & Neto, 2020). The following are likely immediate risk factors for mental health issues in emergency frontline healthcare workers (both medical and non-medical): isolation, high-risk work environments, and close contact with infected individuals (Benjamin et al., 2020). Numerous studies have been conducted to look into the pathophysiology of a virus, its clinical features, prognosis, and treatment modalities, including vaccination; however, significant efforts are also needed to protect the mental wellbeing of healthcare employees (HCEs).

To prioritize mental health assistance and effective interventions for mental wellbeing, it is crucial to start by evaluating high-risk groups' mental health, such as HCEs (Goldmann & Galea, 2014). Due to their frontline duties, they face significant and enduring mental health pressures during crises like the COVID-19 pandemic.Their demanding roles, complex job responsibilities, limited resources, and heightened emotional pressure make them more susceptible to increased job stress (Shen et al., 2020). Consequently, healthcare employees in the industry face an elevated risk of experiencing various mental health issues (Rajkumar, 2020). In a prior study carried out in China among healthcare professionals, high prevalence rates for depression (50.4%), anxiety (44.6%), insomnia (34%), and psychological distress (71.5%) were noted (Lai et al., 2020). HCEs experience heightened emotional responses, which affect their mental, emotional, and physical wellbeing (Batra et al., 2020).

Past research has examined the mental health of healthcare employees during the pandemic, but there has been a lack of comprehensive research exploring significant differences in loneliness, depression, and anxiety (Cabello et al., 2021; Sahebi et al., 2021). Further, past research on loneliness during an epidemic like COVID-19 has looked at its association with depression, especially in the older population (Fang et al., 2021; Repon et al., 2021). So, several studies have focused on the general elderly population without limiting it to any specific sector like healthcare. Therefore, based on previous research, our ability to support HCEs' mental wellbeing is hampered by a lack of knowledge on loneliness and its impacts, especially in times of extreme stress. A study by Stubbs et al. (2021) emphasized the role of different dimensions of loneliness in impacting mental health as one of their limitations, which has been taken up as an objective for the current study; thus, contributing to the literature by filling this specific gap. Also, very little comprehensive research has been done to capture the growing phenomenon of loneliness, especially in India, except the study by Yadav et al. (2022), who found that 28.2% of Mumbai households experienced loneliness. So, our study, which is focused on healthcare employees in India, is aimed at making significant contributions to the mental wellbeing of HCEs. The contribution of this paper is unique from existing relevant studies for two reasons: (1) it systematizes the mental wellbeing of healthcare employees through a social support theoretical framework, and (2) it studies the relationship between dimensions of loneliness and mental health as first-order constructs.

The paper is divided into six sections. Section 1 includes the introduction, followed by literature review in section 2. Section 3 describes the materials and methods, while section 4 presents the results. Next, section 5 outlines the discussion and implications, followed by conclusion in section 6.

2. Literature Review

2.1 Loneliness

According to Peplau and Perlman (1982), "loneliness is the difference between a person's desired and actual social relationships." This discrepancy can lead to negative emotions, such as isolation, even when surrounded by friends and family (Cacioppo & Cacioppo, 2013). According to a different definition, loneliness is the feeling that someone has when they are alone, and there is no affection, closeness, or social connection (Dickens et al., 2011). Loneliness is multifaceted, encompassing three dimensions: intimate, collective, and relational (Cacioppo et al., 2015), which are elaborated in Table 1. Humans possess an inherent inclination to seek a sense of belonging within their social circles. To thrive and succeed in life, individuals also rely on significant others, such as family members and life partners (Cacioppo & Patrick, 2008). Those lacking quality social connections and dependable relationships are prone to experiencing feelings of loneliness and depression. However, it is worth noting that loneliness can also catalyze

Table 1. Dimensions of Loneliness

Dimension	Definition
Intimate Loneliness	Loneliness on an emotional level arises due to the absence of significant others who can provide emotional support and mutual assistance.
Collective Loneliness	Loneliness on a social level arises due to the absence of a fulfilling social network comprising like-minded people.
Relational Loneliness	Loneliness on a relational level arises due to the absence of a quality network of friends and family who can provide sympathy in difficult times.

Source (s): (Cacioppo et al., 2015)

Table 2. Dimensions of Mental Health

Sub-Dimension	Definition
Anxiety	It can be understood as the presence of persistent and excessive worry without any specific stressors; key symptoms include issues in concentrating, insomnia, irritation, persistent fatigue, and others.
Depression	It can be characterized by several symptoms including no interest in daily activities, disturbed sleeping patterns, absence of energetic mood, and being sceptical about one's existence.

Source (s): (Wainberg et al., 2017)

solitary contemplation, self-reflection, and mindfulness exercises, which are crucial for personal growth.

2.2 Mental Health

The World Health Organization acknowledges that mental health is essential to overall wellbeing (WHO, 2013). The global pandemic has significantly exacerbated mental health issues, leading to a rise in severe emotional and psychological disorders among the general population. Consequently, recent research conducted by Wainberg et al. (2017) has focused on investigating anxiety and depression as they serve as key indicators of mental health issues. Anxiety and depression, as defined by Tech et al. (2015), encompass emotional responses characterized by disrupted sleep patterns, fatigue, restlessness, excessive worry, disturbances in daily routines, and heightened irritability. These symptoms contribute to sleep disturbances, exhaustion, restlessness, worry, irregular routines, and increased irritability. In this study, mental health is measured using two dimensions: anxiety and depression, with their clear definitions provided in Table 2.

2.3 Social Support Theoretical Framework

Social support theory is a psychological concept that explores the role of interpersonal relationships and social networks in providing individuals with emotional, instrumental, and informational support. It suggests that having access to supportive relationships can positively influence wellbeing and buffer against stress and adversity (Cobb, 1976; Cohen & Wills, 1985; Sarason et al., 1983; Houseman & Seeman, 1999; Sarason et al., 2020). Social connections play a crucial role in human evolution, providing individuals with mutual support, connectedness, and protection (Cacioppo et al., 2014). The loneliness model based on social neuroscience states that the absence of social support and safety contributes to feelings of isolation or loneliness, accompanied by symptoms such as anxiety, social withdrawal, depression, and hostility. These negative behaviours further intensify feelings of loneliness and reinforce the investigated associations among loneliness, anxiety, and depression (Cacioppo et al., 2014; Hutten et al., 2021). In contrast, social relationships and mutual support significantly reduce loneliness and facilitate positive coping mechanisms for stress (Segrin & Passalacqua, 2010). They provide tangible assistance and emotional care, offering individuals the necessary support to navigate life's challenges (Segrin & Passalacqua, 2010).

The current study uses the social support theory as its theoretical framework to investigate the relationship between different aspects of loneliness, anxiety, and depression. Three perspectives are pertinent to the social support theory: the relationship perspective, the social constructionist perspective, and the stress and coping perspective (Lakey & Cohen, 2000). As per the stress and coping perspective, social support protects against mental health issues like stress and anxiety. In this context, the

absence of collective loneliness enables individuals to connect with like-minded individuals, share ideas, and cope with negative emotions like anxiety and stress. According to the social constructionist viewpoint, social support promotes self-worth and self-control, which benefits mental health. The absence of relational loneliness can facilitate the realization of this perspective and aid in managing stress and depression. Lastly, the relationship perspective emphasizes that social support is intertwined with the presence of significant others who provide companionship and support, contributing to the management of mental health issues like anxiety, depression, and stress. Intimate loneliness reduction manifests this perspective; as close companionship can offer emotional resilience during challenging times.

2.4 Loneliness and mental health

Effect of a pandemic on the mental health of HCEs in crisis-induced-pandemics

Table 3 illustrates the association between the previous pandemics and the current COVID-19 outbreak with higher rates of depression, anxiety, stress, and post-stress traumatic disorder (PTSD) in medical and non-medical healthcare workers (nurses, physicians, allied health professionals, pharmacists, technicians, administrators, clerical staff, and maintenance workers).

During pandemics like COVID-19, healthcare employees (HCEs) have been significantly affected by loneliness due to complex and demanding job roles and duties (Mehta et al., 2021; Lo & de Angelis, 2020). Loneliness has been found to have a strong association with anxiety among HCEs due to uncertainty in the environment and fear of the future (Badahdah et al., 2020). Several studies have demonstrated the prevalence of loneliness among HCEs, highlighting the heightened risk they face as frontline workers. For instance, Italian doctors reported a loneliness rate of 10.4% (De Sio et al., 2021), Spanish HCEs exhibited a rate of 53% (Cabello et al., 2021), and an alarming rate of 89% was observed among Bangladeshi HCEs (Repon et al., 2021). Altered work requirements have affected three out of every five healthcare workers, contributing to a sense of loneliness within the industry. Recent studies by Ananda-Rajah et al. (2020) and Kang et al. (2020) highlighted that HCEs' risk of loneliness has increased due to increased job demands, frustration, fear of infecting loved ones, and social stigma. HCEs experiencing loneliness have reported panic attacks resulting in anxiety due to the absence of quality relationships (Zheng, 2021). Changes in social interactions at work and the high risk of infection have further intensified the psychological strain on HCEs and, thus, triggering anxiety levels among them as it becomes challenging to maintain a fulfilling social network (Franklin & Gkiouleka, 2021; Brooks et al., 2020). Therefore, we see that loneliness has been investigated as a second-order formative-reflective construct until now. Considering the novelty of this research, we posit the following where dimensions of loneliness are taken as first-order constructs to analyze their impact on anxiety.

H1a. *Intimate Loneliness significantly impacts anxiety.*

H1b. *Collective Loneliness significantly impacts anxiety.*

H1c. *Relational Loneliness significantly impacts anxiety.*

Previous studies have consistently demonstrated a strong link between loneliness and depression (Stickley et al., 2015; González-Sanguino et al., 2021; Wang et al., 2021). Additional research by Holvast et al. (2015) supports these findings by revealing a significant correlation between loneliness and depression (Chang et al., 2015; Yao & Zhong, 2014), attributed to individuals' difficulties in managing harmonious relationships with their social peers (Victor & Yang, 2012). This suggests that individuals lacking social connections may encounter loneliness, thereby increasing the risk of depression (Zebhauser et al., 2014). In a study conducted by Dickens et al. (2011), it was found that individuals who lack a sense of belongingness within their social networks face a higher risk of loneliness, which has been linked with increased depression levels (Beutel et al., 2017; Killgore et al., 2020). Moreover, the absence of emotional bonding with significant others contributes to feelings of isolation and loneliness, resulting in depression (Hawkley & Capitanio, 2015; Hawkley & Cacioppo, 2010). In line with these findings, recent studies also have reported higher levels of depression among individuals experiencing loneliness (De Sio et al., 2020, 2021; Fang et al., 2021; McQuaid et al., 2021). Again, the relationship between loneliness and depression has been studied while taking loneliness as a second-order formative-reflective construct. To further contribute to this study's novelty, dimensions of loneliness have been taken as first-order constructs for examining their impact on depression. We thus postulate:

H2a. *Intimate Loneliness significantly impacts depression.*

H2b. *Collective Loneliness significantly impacts depression.*

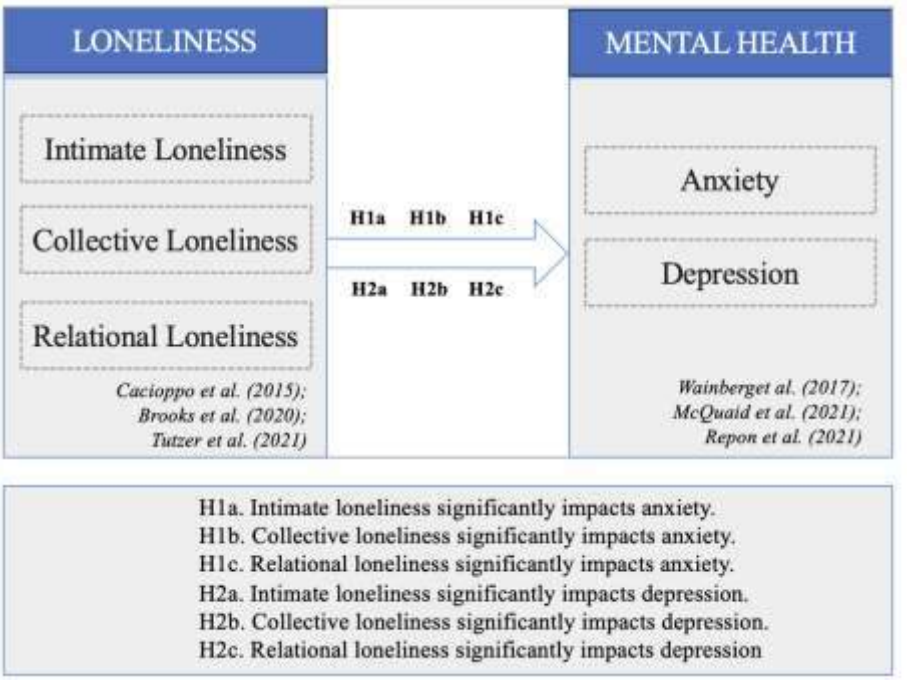
H2c. *Relational Loneliness significantly impacts depression*

Based on the literature review and the research hypotheses, a model designed to analyze the effect of loneliness (intimate, collective, and relational) on dimensions of mental health (anxiety and depression) is presented in Figure 1.

Table 3. Evidence of the psychological impact of pandemics on HCEs

Sl. No.	Author(s) / Year of Study	Pandemic	Country	Study Design	Evidenced Psychological Impact on HCEs
1.	Lai et al. (2020)	COVID-19	China	Cross-sectional	Distress, Depression, Anxiety, Lack of Sleep
2.	Li et al. (2020)		China		Vicarious Traumatization
3.	Huang et al. (2020)		China		Anxiety, Post-Traumatic Stress Disorder
4.	Xiao et al. (2020)		China		Low Sleep Quality, Anxiety, Stress
5.	Benjamin et al. (2020)		Singapore		Anxiety, Depression, Stress PTSD
6.	Zhang et al. (2020)		China		Insomnia, Anxiety, Depression, Obsessive-Compulsive Disorder Symptoms
7.	Zhu et al. (2020)		China		Anxiety, Depression
8.	Lee et al. (2018)	MERS-CoV	South Korea	Cohort prospective	PTSD-Like Symptoms,
9.	Kim and Choi (2016)		South Korea	Cross-sectional	Burnout
10.	Bukhari et al., (2016)		Saudi Arabia		Worry, Fear
11.	Khalid et al., (2016)		Saudi Arabia		Fear, Distress
12.	Matsuishi et al. (2012)	H1N1	Japan		Anxiety
13.	Austria-Corrales et al., (2011)		Mexico	Transversal descriptive study	Burnout Syndrome
14.	Goulia et al. (2010)		Greece	Cross-sectional	Anxiety, Fear, Worry, Psychological Distress
15.	Wu et al. (2009)	SARS	China	Cohort prospective	Posttraumatic Stress (PTS) Symptom, Fear
16.	Su et al. (2007)		Taiwan		Depression, Insomnia PTSD
17.	McAlonan et al. (2007)		China		Stress, Fatigue, Poor Sleep, Worry, Fear, Depression, Anxiety, PTSD
18.	Chan et al. (2005)		Hong Kong, China	Cross-sectional study	Stress
19.	Koh et al. (2005)		Singapore		Work Stress, Worry
20.	Grace et al. (2005)		Canada		Distress
21.	Sim et al. (2004)		Singapore		Psychiatric and Post-Traumatic (PTSD) Morbidity
22.	Chua et al. (2004)		China		Fatigue, Worry, General Stress, Mood and Stress-Related Disorders, Functional Impairment in Post-Recovery Phase.

Source (s): Prepared by authors



Source (s): Prepared by authors

Figure 1. Conceptual Model

3. Materials and Methods

This study adopts a conclusive-descriptive research design involving a cross-sectional study. Data collection involved the utilization of a structured online questionnaire, which participants completed in the English language. Convenience and snowball sampling techniques were employed to recruit participants. Voluntary participation was emphasized, and participants did not receive compensation or rewards. The questionnaire for the study used three adapted scales. The Doring and Bortz' (1993) UCLA Loneliness Scale's short version comprises nine items reflecting three dimensions of loneliness: intimate loneliness, collective loneliness, and relational loneliness (Luhmann et al., 2016). The responses were recorded on a scale of 1 to 4, where 1= never, 2= rarely, 3= sometimes, and 4= always. In this study, UCLA confirmed internal reliability with a Cronbach's alpha of 0.772, 0.859, and 0.729 for intimate, collective, and relational loneliness, respectively. The Generalized Anxiety Disorder (GAD) scale by Lowe et al. (2008) consists of seven items. The responses were recorded on a scale of 0 to 3, where 0= not at all, 1= several days, 2= more than half the days, and 0= almost every day. On the GAD-7 Scale, there are four possible levels of anxiety severity: minimal (0–4), mild (5–9), moderate (10–14), and severe (15–21). The GAD-7 demonstrated exceptional internal reliability in this study, with a Cronbach's alpha of 0.892. The nine-item Patient Health Questionnaire (PHQ-9) was used for measuring depression (Martin et al., 2006). Ratings ranged from 0 (not at all) to 3 (almost every day) for the responses. According to the PHQ-9, there are four possible levels of depression severity: minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27). The PHQ-9 also showed excellent internal reliability in this study, with a Cronbach's alpha of 0.878. One hundred fifty respondents filled out the online self-reported survey to participate in the study. 32% of the participants were doctors and 68% were nurses. The participant's demographic information is shown in Table 4 below.

Table 4. Demographic Details of Participants

Demographic variable		n	Percent
Gender	Male Female Prefer not to say	70 80 0	46.7% 53.3% 0%
Age group	1981-1996 1997-2013	126 24	84.0% 16.0%
Work Profile	Junior/Senior Resident Doctors Nurses	48 102	32% 68%
Work Experience (in years)	1-5 6-10 More than 10	114 30 6	76% 20% 4%
Organization Type	Private Hospital Public Hospital	121 29	80.7% 19.3%

Source(s): Prepared by authors

Table 5. Composite reliability (CR), Average variance extracted (AVE), the square root of the average variance extracted (AVE) (in bold), and correlations between constructs (off-diagonal)

First-order Constructs	CR	AVE	Intimate Loneliness	Collective Loneliness	Relational Loneliness	Anxiety	Depression
Intimate Loneliness	0.700	0.438	**0.662**				
Collective Loneliness	0.853	0.659	-.423	**0.812**			
Relational Loneliness	0.750	0.508	-.385	.467	**0.713**		
Anxiety	0.872	0.501	-0.143	0.170	-.003	**0.708**	
Depression	0.869	0.499	-0.141	0.186	.010	0.233	**0.707**

Source(s): Prepared by authors

SPSS Version 26 was utilized to conduct data analysis. The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests, which were used to assess normality, showed that the data were distributed normally. Further, the scatter plot showed no exponential or parabolic curve, confirming that data did not face non-linearity issues. Using the two-tailed t-test, no significant statistical difference at the $p < 0.05$ level was discovered between the study's early and late respondents; this eliminated the possibility of non-response bias. According to Harman's single-factor test, all items extracted a value of 22.213% when taken as a single factor, indicating that common method bias was not an issue in this investigation. Lastly, the variance inflation factor was used to check for multicollinearity. There were never any variance inflation factor values above the 3.0 minimum threshold, indicating no multicollinearity problems in the data.

4. Results

Internal consistency was checked using composite reliability (CR), which had values between 0.700 and 0.887, above the suggested cutoff of 0.600. Next, the validity of convergence and discrimination were assessed. Above the 0.500 threshold, the average variance extracted (AVE) varied from 0.501 to 0.663. Henseler (2017) proposed the Fornell-Larcker (1981) criterion, which was used to test discriminant validity. According to this criterion, if the square roots of the estimated AVEs are larger than the correlations between each pair of variables in the model, then the model has achieved discriminant validity. According to the Fornell-Larcker criterion, discriminant validity has been attained, as indicated by the results displayed in Table 5. As a result, the study's measures showed acceptable levels of discriminant validity, convergent validity, and reliability, demonstrating the stability and uniqueness of the concepts being assessed.

Descriptive statistics were performed using mean and standard deviation, as depicted in Table 6. The mean scores of the sub-dimensions of loneliness suggest that the sample experienced collective loneliness (highest mean value = 2.7356) more often than intimate (2.4867) and relational loneliness (2.6267). Ultimately, the sample experienced mild anxiety (8.4135) and moderate depression (10.4989), according to the mean scores for these conditions.

The dependent variables, anxiety, as shown in Table 7 (a), and depression, as shown in Table 7 (b), were regressed on predicting variables of intimate loneliness, collective loneliness, and relational loneliness. The independent variables significantly predict anxiety and depression; F (3, 147) = 2.469, $p< 0.05$, and F (3, 147) = 2.600, $p< 0.05$, respectively, which indicates that the overall model shows a significant impact on anxiety and depression. Moreover, $R2$ in Table 7 (a) is .048, and in Table 7 (b) is .051, meaning that dimensions of loneliness can account for only 4.8% of the variation in anxiety and 5.1% variation in depression. Furthermore, additional analyses were conducted to determine the impact of each criterion variable's factors (Loneliness). The results revealed that collective loneliness has a significant and positive effect on anxiety (b= 1.099, t= 1.913, p= .048). Hence, H1b was supported. Collective loneliness was also found to have a significant and positive impact on depression (b= 1.450, t= 2.089, p= .038). Hence, H2b was supported.

Table 6. Mean and S.D. of study variables

Variable	Mean	Standard Deviation
Loneliness	2.6163	.3640
Intimate Loneliness	2.4867	.71797
Collective Loneliness	2.7356	.80296
Relational Loneliness	2.6267	. 62976
Mental Health	9.4562	5.29084
Anxiety	8.4135	4.82054
Depression	10.4989	5.83392

Source(s): Prepared by authors

Table 7 (a). Hypotheses Results

Hypotheses	Regression Weights	b	t	p-value	Results
H1a	IL → A	-.786	-1.277	.204	Not supported
H1b	CL→A	1.099	1.913	.048*	Supported
H1c	RL→A	-1.022	-1.422	.157	Not supported
R square	.048				
F (3, 147)	2.469				
Note. * p< 0.05. IL: Intimate Loneliness, CL: Collective Loneliness, RL: Relational Loneliness, A: Anxiety					

Source(s): Prepared by authors

Table 7 (b). Hypotheses Results

Hypotheses	Regression Weights	b	t	p-value	Results
H2a	IL → D	-.850	-1.143	.255	Not supported
H2b	CL→D	1.450	2.089	.038	Supported
H2c	RL→D	-1.147	-1.319	.189	Not supported
R square	.048				
F (3, 147)	2.469				
Note. *p< 0.05. IL: Intimate Loneliness, CL: Collective Loneliness, RL: Relational Loneliness, D: Depression					

Source(s): Prepared by authors

5. Discussion and Implications

Pandemics not only make people physically sick but also cause many mental health problems. In each of the 21st-century pandemics, we have consistently seen how HCEs have been psychologically affected. HCEs are at the forefront and bear the maximum brunt of health disasters. About 600 HCEs in the USA alone have died while protecting the population from COVID-19 (Jewett et al., 2020). Besides the fatalities associated with pandemics, mental health issues are a serious problem that needs the attention of policymakers. It was reported that SARS-infected HCEs displayed more negative emotions than other patients of that virus (Chua et al. 2004). Even under normal circumstances, the medical profession is very stressful as considerable physical and mental strains are associated with the nature of work. Medical and related occupational groups, unfortunately, also have a very high suicide rate, a trend regarded as an 'occupational hazard' by some experts, with physicians having the highest suicide rate among all professions (Chard, 2020). One doctor commits suicide in the US every day; the rate of doctor suicides: the rate in the general population is 28 to 40 per 100,000, 12.3 per 100,000, which is more than twice that of the general population (Anderson, 2018). The WHO (2022) reports that suicide rates are greater worldwide among those in the healthcare sector. Even after adjusting for the occupational risk of exposure to COVID-19, a longitudinal Austrian study done between April and December 2020 by Niederkrotenthaler et al. (2022) revealed that healthcare employees had a higher chance of having suicidal ideation than non-healthcare workers.

The problem and the resolution to the current loneliness crisis are found in one apparent fact: people are social beings. Murthy V. H. (2020) states, "At the heart of our loneliness is our fundamental urge to connect." Humans have evolved to interact with one another, form enduring relationships, aid one another, share life experiences, and are stronger together. Overcoming loneliness depends on healthy relationships. Addressing feelings of loneliness goes beyond simply increasing social connections or the frequency of social interactions (Smith & Lim, 2020). Similar to this study, other researchers have also shown that social network size (Rumas et al., 2021; Segrin & Passalacqua, 2010), frequency of social interactions (Macdonald & Hülür, 2021), and type of contact (e.g., in-person or virtual) (Groarke et al., 2020; Rumas et al., 2021). These factors are not the only ones that affect loneliness. Instead, social relationships' perceived quality and connectedness are essential factors (Bu et al., 2020; Groarke et al., 2020). Furthermore, feelings of loneliness can contribute to mental health issues unless individuals are satisfied with the frequency and quality of their social interactions, which fulfil their personal and emotional needs (Macdonald & Hülür, 2021). Research by Kahlon et al. (2021) focused on alleviating loneliness has shown that calls and video calls showcasing empathy, particularly during crises like the COVID-19 pandemic, can promote individuals' mental wellbeing (O'Sullivan et al., 2021).

We found a significant relationship among collective loneliness, anxiety, and depression among healthcare employees (HCEs). During crises, it becomes crucial to prioritize the mental wellbeing of HCEs and address collective loneliness. Therefore, as a preventive measure, it is essential to consider individual preferences and modify social interactions among colleagues to help reduce work-life conflict and combat psychological challenges. This aligns with the social support theory, which suggests that colleagues and family support can mitigate the impact of loneliness on mental health (Beutel et al., 2021). Additionally, social support theory's stress and coping perspective affirms that understanding among co-workers and social support can guard against loneliness and mental health problems like depression and anxiety (Rogers et al., 2016). Healthcare systems are essential for preventing workplace loneliness and fostering mental wellness among their employees. Evidence-based measures that address emotionally challenging experiences, such as those arising from the COVID-19 crisis, can significantly benefit healthcare workers. Healthcare management should prioritize team-based initiatives to combat collective loneliness while also offering emotional support, constructive feedback, counselling, and post-traumatic therapy. Understanding the specific risk factors contributing to collective loneliness among healthcare professionals is crucial for implementing targeted interventions, such as group counselling sessions, skill workshops, helplines, and burnout leaves, which can effectively address these challenges. Additionally, fostering a sense of camaraderie among HCEs can mitigate the psychological difficulties associated with loneliness and mental health (Kim, 2018; Maunder et al., 2006), ultimately strengthening the mental

health of those on the front lines during infectious disease outbreaks like COVID-19 (Sun et al., 2020).

Increasing social connections is not the only way to combat loneliness, as social media sites also impact it. In addition to contact frequency and type, perceived closeness and relationship quality also play a significant role (Calzadilla-Núñez et al., 2017). In this regard, an effective strategy fosters a culture of active teamwork within healthcare organizations. Cultivating a sense of shared purpose and camaraderie among colleagues can enhance relationship quality and prevent loneliness. Teamwork and the quality of relationships with colleagues, friends, and family are crucial in protecting the wellbeing of HCEs by reducing stress and pressure resulting from high workloads. For example, interventions at the organizational level, like celebrating Doctor's Day and Nurses' Day, can help build feelings of camaraderie and trust among HCEs. Such practices, already prevalent in some private-sector healthcare organizations, can also be implemented in public-sector healthcare organizations to help employees cope with loneliness.

Furthermore, tailoring social interactions to each person's preferences could be a useful tactic in the fight against loneliness. Recent research by Stubbs et al. (2021) highlights the significant impact of pandemics on the increased loneliness experienced by healthcare workers. Consistent with previous studies (Beutel et al., 2017), Loneliness and mental health are significantly associated over time. This relationship persists during and after the pandemic, as supported by studies conducted by Cabello et al. (2021), Fang et al. (2021), Hoffart et al. (2020), and O'Sullivan et al. (2021). Importantly, the findings of our study also confirm the same by extending to the dimension of collective loneliness.

In addition to practical implications for private and public health sector organizations, this study significantly contributes to medical education. In this regard, the optimization of interpersonal skills instruction and evaluation as part of the medical curriculum is significantly impacted by the findings of this study. Primarily, medical education focuses on basic sciences, clinical sciences, engineering, and innovation, although empathy and interpersonal skills are necessary attributes for medical students. Our study findings reveal the importance of building interpersonal competency among medical students to manage relationships with their colleagues and patients effectively. For this, the curriculum in medical education should also include training in interpersonal skills development and relationship management. This will help equip the medical staff and students with the soft skills and abilities necessary for building trust and like-minded networks.

Irrespective of the development status of countries, HCEs all over the world are under tremendous mental pressure in the face of pandemics. The critical need is, therefore, to not only enhance the capacity of healthcare systems but also focus on supporting HCEs in an integrated manner. Societies and their governments have an essential role to play in this. All nations should prioritize providing healthcare infrastructure and assistance to HCEs, as nation-building initiatives cannot be successful without sufficient attention to population health. Taylor (2019) advocates the need for implementing procedures to identify people with a propensity for or who may be undergoing a significantly high level of distress during a pandemic (Taylor, 2019). At the national level, countries should benchmark their healthcare systems with those with integrated wellbeing systems within their healthcare sector. The Canadian healthcare sector, for instance, has accepted the 'National Standard of Canada for Psychological Health and Safety in the Workplace', a step that has brought the mental health conversation to the forefront (Howatt & Bradley, 2018). A lack of mental health support systems during pandemics can enhance the risk of people developing psychological disorders, thus making it critical to have support systems in place during a pandemic. Every research review by us has recommended specific coping interventions for the management of evidenced mental health problems. Through this study, we have tried to focus on each stakeholder's critical role in managing the wellbeing of HCEs. This paper makes a strong case for giving importance to the wellbeing of HCEs worldwide. With shortcomings in countries' healthcare systems laid threadbare, there is an urgent need to review and overhaul its different components and embed wellbeing-supportive policies and systems.

6. Conclusion

When interpreting the findings, it is essential to consider the current study's limitations. First, the cross-sectional research design used in this study makes it more challenging to determine the causal relationships between the examined

variables. Future research should consider longitudinal designs to replicate the findings and enhance generalizability. Further, our study points to several important areas of research. Studies are needed in the area of collective loneliness, as our study findings indicate its significant negative impact on anxiety and depression. Investigating the role of social interactions and active social networks in preventing loneliness can be studied further as collective loneliness was found to be a significant predictor of mental health. Further, the moderating role of gender can be explored while examining the relationship between collective loneliness and mental health, as past research has highlighted that women are more prone to the risk of loneliness and mental health due to their intense personal and professional commitments. Another interesting area for future research is the neurology of loneliness, which can be analyzed for its impact on the brain, health, and wellbeing. Such future directions are recommended to increase the current study's scope.

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Behavioural Biases Affecting Financial Risk Tolerance of Working Women Investors: Evidence from the Indian Stock Market

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Abstract

Behavioral finance is based on psychological theories that explain market irregularities. Financial risk tolerance is the highest degree of volatility that an investor may accept while making investment decisions. Behavioural biases play a crucial role in shaping individuals' financial risk tolerance. This paper examines the effect of behavioural biases on the financial risk tolerance of working women investors. Three biases are selected, i.e., loss aversion, anchoring, and herding. The questionnaire survey investigation was conducted to collect data from a total sample of 196 working women investors who traded on the Indian stock market in Uttar Pradesh, India. A Grable scale is used to gauge women's tolerance for financial risk. Women investors are conservative investors, and they belong to the category of investors with an average to below-average level of risk tolerance. Regression analysis is employed to measure the impact. Findings show that all three selected biases, i.e., loss aversion, anchoring, and herding, significantly influence financial risk tolerance. Loss aversion has the most significant impact on financial risk tolerance capacity (-0.636), followed by herding (-0.317), while anchoring has the least (-0.197). Previous research has not been done only on working women investors, and this fills the gap. This study will assist women investors in understanding their risk tolerance capacity and making rational investment decisions.

Keywords: *Behavioral Biases, Financial Risk Tolerance, Working Women Investors, Indian Stock Market*

1. Introduction

Women investors are a dynamic and developing group in the financial environment. Working women investors often seek financial independence to build wealth and secure their financial future (Srivastava et al., 2024). Due to the changing environment, women realise the power of investing and adopt a disciplined and careful approach to it. Women investors prefer investing in stocks, bonds, and mutual funds to increase their wealth. This led to an increase in the participation of women in stock market investing. The Indian stock market also takes proactive measures to encourage more women investors to participate in the stock market (Maini, 2017). According to recent data from the National Stock Exchange (NSE, 2023), the number of women investors increased from 17% in 2020 to 24% in 2024. Despite this increase, research shows that women investors are conservative and prefer investing in long-term assets (Kappal & Rastogi, 2020). Asandimitra et al. (2019) concluded that women are less confident in their investment decisions and have lower financial literacy. Working women investors often navigate a complex interplay of behavioural biases, personal risk tolerance, and socio-economic factors, which together shape their investment choices (Bushra et al., 2023; Salem, 2019).

Standard finance theories assume that investors are rational and take care of all the available information, and no one can take advantage of the market (Fama, 1970). However, contrary to what economists believe, psychologists have discovered that people do not act logically. Behavioral finance is based on psychological theories that explain market irregularities. Kahneman and Tversky (2019) asserts that investors' rationality is skewed, and various emotional and cognitive factors influence their decisions. These factors, which are known as behavioural finance biases, might have an impact on how risk is conceived and handled. As defined by Grable and Joo (1999), financial risk tolerance is the highest degree of volatility an investor may accept while making investment decisions. It is an important consideration when making financial decisions and has a significant effect on investment decision-making. Pompian (2017) have concluded the list of various behavioural biases, including anchoring, loss aversion, herding, and others, that have significantly influenced an individual's financial risk tolerance.

Women investors are prone to various behavioural biases while making investment decisions. Panja (2023) concluded that anchoring bias is found in the behavior of women investors who are investing in the capital market. Salem (2019) found that women investors are more prone to following the investment behavior of their family and friends (Grable & Roszkowski, 2007). Studies have shown that women underestimate their risk-taking aptitude and are loss-averse.

This study aims to measure the financial risk tolerance capacity of women investors and determine the effects of anchoring, herding, and loss aversion on the financial risk tolerance of working women investors trading in the Indian Stock Market. The practical implications of this study will build self-awareness among women investors to recognise these biases and empower them to make more informed and rational decisions, aligning their risk tolerance with their financial goals in a more accurate manner. Working women investors become aware of the anchoring, herding, and loss-aversion inherent in their behaviour, which impacts their risk tolerance capacity and, ultimately, their investing decision-making. Financial professionals often work to identify and mitigate these biases through education, tailored advice, and ongoing communication.

2. Literature Review and Hypothesis Development

2.1 Working Women Investor's Risk Tolerance Capacity

Women in the workforce desire financial security and independence. They wish to invest their money to deal with difficult circumstances at any point in their lives. Working women have several investing possibilities, including mutual funds, stocks, banks, gold, and real estate, each with different goals like appreciation, profit, security, and stable income (Gangwani & Al Mazyad, 2020). Their choices concerning investments are influenced by several factors, including their willingness to take on risk, the influence of friends and family, their income, expenses, and savings, as well as financial literacy (Asandimitra et al., 2019). However, regarding stock market investment, women are typically less confident, risk-averse, conservative, and less knowledgeable about finance (Sharma & Kota, 2019). Women participated in all types of financial assets, although they tended to favour the less risky options, such as debentures and preference shares, over common shares (Maltby & Rutterford, 2006). The utmost level of volatility a person can tolerate while making investing decisions is referred to as financial risk tolerance. Two approaches are often used to describe financial risk tolerance: objective and subjective (Marinelli et al., 2017). Subjective risk tolerance is the self-evaluation of a person's risk tolerance or what

people say about their ability to tolerate danger. Subjective evaluation is based on the belief that something negative may happen based on one's feelings, ideas, and intuition (Grable, 1999).

Objective risk tolerance is defined by examining investors' investing behaviour in the composition of their portfolios. Therefore, there is a discrepancy between how individuals perceive their capacity for risk tolerance and what risk is revealed in the makeup of their portfolios. Dickason and Ferreira (2018) grouped investors into four groups: conservative, moderate, growth, and aggressive, based on their risk-taking capacity. Grable and Joo (2004) investigates how socio-economic, demographic, and attitude characteristics affect a person's ability to handle financial risk. Men and women have varying capacities for accepting danger (Hallahan et al., 2003). Compared to women, men are better able to tolerate financial risk (Dickason & Ferreira, 2018).

2.2 Anchoring and Financial Risk Tolerance

Anchoring bias, as defined by Tversky and Kahneman (1987), is a set of cognitive shortcuts humans use. It is based on the first amount of information people are given, and they base their choices on that information (Choy & Wei, 2022). Investors can use the 52-week price ranges with highs and lows as anchors. For instance, investors may be reluctant to purchase a stock if it is getting close to its 52-week price high because they believe the price is too high relative to the anchor.

In contrast, investors may view a stock approaching its 52-week price low as a buying opportunity because they believe the price is low about the anchor. Male and female investors both exhibit anchoring bias, according to Owusu and Laryea (2022). The anchoring heuristic is usually more prevalent among women (Cascão et al., 2023). Anchoring bias can affect conservative investors with a medium-risk tolerance level because they cling to a limited amount of information and adjust to new information (Dickason & Ferreira, 2018). Kasoga (2021) identified that risk-tolerant investors use the previous market's high rate of return as a baseline for projecting future returns on investment. This supports the claim made by Kahneman and Tversky (1974) that risk-taking investors use an anchoring heuristic to link established prices to historical stock prices.

H1- Anchoring significantly impacts the financial risk tolerance of working women investors.

2.3 Herding and Financial Risk Tolerance

Herd behaviour describes how individuals in a group can act together without planned direction. Herding behaviour in the stock market mimics the investment patterns of other investors. Sachdeva et al. (2023) discovered that herding creates an environment where investors act in the group in contrast to their beliefs. There are various types of herding prevailing in the market. As defined by Bikhchandani and Sharma (2000), intentional herding is derived from a strong willingness of investors to mimic the actions of other investors in the market. Spurious herding occurs when a group faces similar decision situations and data sets, and each member takes similar decisions independently and, thus, without learning the decisions of others. This may result from information investors receive through newspapers or insider traders. In the stock market, the term "herding mentality" refers to imitating other investors' buying and selling behaviour. In the stock market, several variables contribute to investor herding behaviour, including unfavourable news attitudes toward equities, market uncertainty, volatility risk, an increase in interest rates, currency depreciation, and financial crises (Rahayu et al., 2021). According to Nair et al. (2017), female investors are seen as having a stronger herding tendency than male investors. When making financial decisions, female investors are more prone to imitate the actions of other investors. Their financial judgments will quickly shift in response to the information they receive from trustworthy sources or family (Zainul & Suryani, 2021). Saputri et al. (2023) results demonstrated that risk tolerance is considerably negatively impacted by herding behaviour. This indicates that while making investing decisions, investors with a strong herding tendency will have a lower tolerance for risk. Christoffersen and Stæhr (2019) predict that less risk-tolerant individuals are more likely to herd in the stock market.

H2- Herding significantly impacts the financial risk tolerance of working women investors.

2.4 Loss Aversion and Financial Risk Tolerance

Individuals are much more distressed by coming losses than they are delighted by equivalent gains. Kahneman and Tversky (2019) discovered that people are willing to take more risks to avoid losses than to realize gains. This behaviour of investors comes under the category of loss aversion bias. Kengatharan and Kengatharan (2014) concluded that loss aversion is a prevalent bias influencing

investors' financial decisions. Even when the profit potential is excellent, an investor is less likely to purchase a stock if there is a chance of losing money. When investing in the stock market, women investors are generally risk-averse. The low-risk behaviour of women investors may be due to their lack of financial knowledge (Rau, 2014). Woods et al. (2020) concluded that loss aversion is correlated with reduced risk appetite and tolerance, which suggests that this behavioural bias may significantly influence people's financial decisions. Singh et al. (2023) findings indicated that risk-tolerance behaviour substantially influences loss aversion, which shows that loss-averse investors are untrustworthy and incapable of performing market research.

H3- Loss aversion significantly impacts the financial risk tolerance of working women investors.

3. Data and Methodology

3.1 Data

This study is based on a cross-sectional descriptive research design. The working women investors trading in the Indian stock market and residing in the four major cities of Uttar Pradesh—Lucknow, Noida, Allahabad, and Kanpur—comprised the population of this research. The study sample consists of working women investors willing and able to trade in the Indian stock market and have a demat account. The sample size is calculated for the unidentified population using the formula below:

$$SS = [Z2p\ (1 - p)]/\ C2]$$

SS = Sample size, Z = Given Z value, p = Percentage of population, C = Confidence level

The necessary sample size is 196 when using the 95% confidence interval, 50% population percentage, and 7% margin of error.

Working women investors were recruited using convenience and snowball sampling techniques because the study's total population is unknown. Financial brokers approached women investors, and a questionnaire, using a Google form, was mailed to them.

3.2 Questionnaire

A structured questionnaire is created for data collection. There are three sections to the questionnaire. The first segment requested demographic information on working women investors' ages, income, education, occupation, frequency of trading, and investment experience. The next segment contains items that identify anchoring, herding, and loss-aversion behaviour using the scale adopted by Waweru et al. (2008) and Jain et al. (2020). A total of 8 items were included in the questionnaire, and each behavioural bias was measured using 2 to 4 items. Each question in sections 2 and 3 uses a Likert scale. The third section assesses women investors' financial risk tolerance capacity using the 13-item Grable scale (Grable, 1999).

3.3 Analysis

SPSS version 22 software is used for analysing both descriptive and inferential statistics. Financial risk tolerance is classified into five categories: low-risk tolerance, below-average risk tolerance, average risk tolerance, above-average risk tolerance, and high-risk tolerance. Based on this, women investors were divided into distinct categories based on their risk-taking abilities. Regression analysis establishes a link between behavioural biases and financial risk tolerance. The independent variables in this study include anchoring, herding, and loss aversion, whereas the dependent variable is financial risk tolerance. Multiple regression analysis determines which psychological biases have the least and most influence on financial risk tolerance.

4. Results and Discussion

4.1 Demographic Details

Table 1 shows the demographic details of working women investors.

4.1 Financial Risk Tolerance Capacity

The 13-item (Grable, 1999) scale is utilised in the investigation to measure working women investors' financial risk tolerance capacity. The scale assessed the subjective and multidimensional character of risk tolerance among women investors by integrating questions on numerous personal risky scenarios. Working women investors' financial risk tolerance capacity is calculated by adding the total weights assigned to each item on a 13-item risk tolerance scale. Women investors were categorised into five groups based on their weights, which ranged from 13 to 47. Table 2 depicts that the maximum number of working women are below-average risk-tolerant and average risk-tolerant.

Table 1. Demographic Details of Women Investors

Demographic Factors	Frequency	Percentage
Age		
1 < 25 Years	21	10.7%
2 25-35 Years	45	22.9%
3 36-45 Years	54	27.6%
4 46-55 Years	52	26.5%
5 > 55 Years	24	12.3%
Education Qualification		
1 Undergraduate	21	10.7%
2 Graduate	54	27.6%
3 Post Graduate	86	43.9%
4 Professional	35	17.8%
Marital Status		
1 Single	84	42.8%
2 Married	92	46.9%
3 Separated/Divorced	20	10.3%
Occupation		
1 Government Employee	64	32.6%
2 Private Employee	82	41.8%
3 Business	50	25.5%
Annual Income (In Rupees)		
1 < 5 lakhs	34	17.3%
2 5-10 lakhs	85	43.4%
3 > 10 lakhs	77	39.3
Frequency of Trading		
1 Daily	19	0.9%
2 Monthly	71	36.1%
3 Quarterly	50	25.5%
4 Annually	56	28.5%
Stock Market Experience		
1 < 1 Year	32	16.3%
2 1- 5 Years	111	56.6%
3 6-10 Years	43	21.9%
4 > 10 Years	10	5.2%

Table 2. Levels of Financial Risk Tolerance

Scores	Levels of Financial Risk Tolerance	Number of Risk Tolerance in each category	Percentage
13-18	Low Risk Tolerant	23	11.7%
19-22	Below- Average Risk Tolerant	68	34.6%
23-28	Average Risk Tolerant	58	29.7%
29-32	Above Average Risk Tolerant	29	14.8%
33-47	High Risk Tolerant	18	9.2%
TOTAL		196	100

4.1 Regression Result

The multiple regression model evaluates the magnitude of the association between the dependent and independent variables. In this situation, the independent variables are psychological biases (anchoring, herding, and loss aversion), while the dependent variable is financial risk tolerance. Table 3 shows that the estimated coefficient of correlation indicates a value of 0.735, which means that a strong linear correlation exists between financial risk tolerance and behavioural biases (anchoring, loss aversion, and herding). Adjusted R-square result suggested that all independent variables (herding, loss-aversion, and anchoring) account for 54% variation in financial risk tolerance. It also implies that the remaining 4% of this difference in financial risk tolerance is related to other factors not considered in this study. As a result, it is regarded as a credible model because it comprises the appropriate variables, which show roughly 55% variation. Table 4, F statistics ($p< 0.05$) show the overall fitness of the model, and the calculated regression model is reliable for prediction.

Table 3. Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.735[a]	.541	.533	.771
a Predictors: (Constant), Loss Aversion, Anchoring, Herding				

Table 4. Overall Significance

ANOVA [a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	134.491	3	44.830	75.332	.000[b]
	Residual	114.259	192	0.595		
	Total	248.750	195			
a. Dependent Variable: FINANCIAL RISK TOLERANCE (1,2,3,4,5)						
b. Predictors: (Constant), Loss Aversion, Anchoring, Herding						

Table 5. Individual Significance

Coefficients						
Model		Unstandardised Coefficients		Standardised Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.755	0.279		24.224	0.000
	Anchoring	-0.197	0.061	-0.181	-3.234	0.001
	Herding	-0.317	0.072	-0.253	-4.395	0.000
	Loss Aversion	-0.636	0.063	-0.523	-10.110	0.000
a. Dependent Variable: FINANCIAL RISK TOLERANCE (1,2,3,4,5)						

For the Regression Equation,

For the Regression Equation,

Financial Risk Tolerance = $\beta + \beta_1$ Anchoring + β_2 Herding + β_3 Loss Aversion + ε

$6.755 = \beta_0 - 0.197$Anchoring $- 0.317$Herding $- 0.636$Loss Aversion + ε

β_0 = Constant; β_1, β_2, β_3 = Regression Coefficient; ε = error term.

Using the specified regression equation and keeping all independent variables (Anchoring, Herding, and loss aversion) equal at zero, the financial risk tolerance capacity is 6.755. Furthermore, anchoring, herding, and loss aversion

harm working women investors' financial risk tolerance. Loss aversion has the most significant influence on financial risk tolerance capacity (-0.636), followed by herding (-0.317), while anchoring has the least (-0.197).

Regarding anchoring bias, the significance value is 0.000, which is highly significant at the index of 0.001, and the t value is -3.234, over the threshold of -2.4. Thus, based on the results, we accept the first hypothesis and conclude that anchoring significantly negatively impacts working women investors' financial risk tolerance. This shows that working women stock market investors highly susceptible to anchoring bias have lower risk tolerance levels. This conclusion is also consistent with Pompian (2017), Singh et al. (2023), and Dickason & Ferreira (2018), who discovered that anchoring has a detrimental influence on financial risk tolerance.

The t-value and significance level for herding bias are -4.395 and 0.000, respectively. Its t value exceeds the threshold of -2.4, and its significance level is below the 0.05 threshold. We accept the second hypothesis and conclude that herding detrimentally affects working women investors' financial risk tolerance, rejecting the null hypothesis. Women investors' propensity to herd will impact their capacity to withstand financial risk in the stock market. This result is supported by Lin (2012) and Saputri et al. (2023).

Loss aversion is shown to have a t-value of -10.11, greater than the threshold of -2.4, and a significance value of 0.000, which is highly significant at an index of 0.01. The third hypothesis is accepted, and it can be deduced that loss aversion substantially negatively influences working women investors' ability to tolerate financial risk. It can be concluded that investors with a tendency for loss aversion are less risk tolerant. The study findings are consistent with Pompian (2017) and Woods et al. (2020).

5. Conclusion

Due to the changing environment, women realise the power of investing and adopt a disciplined and careful approach to it. Working women investors are becoming more prevalent in the equities and mutual fund markets. This paper aims to determine the impact of Anchoring, Herding, and Loss Aversion on working women investors' financial risk tolerance capacity. According to the findings, most working women investors have a risk tolerance that ranges from below-average to average levels. Loss aversion, herding, and anchoring all hurt the ability of working women investors to tolerate financial risk, which indicates that an increase in all three biases leads to a drop in their financial risk tolerance and vice versa. These findings are consistent with those shown in Salem (2019), Dickason & Ferreira (2018a), Pompian (2017), Woods et al. (2020), Singh et al. (2023), and Saputri et al. (2023).

However, just like previous studies, this one also has some limitations. This study was carried out in the state of Uttar Pradesh. The results can differ if the experiment is carried out in a different place. Although the sample size of 196 is appropriate for statistical calculations, it is based on a finite sample selected from a specific location and does not accurately reflect the whole population. The information gathered for this study is also subjective, which depends on each person's attitude, motivation, willingness, and consent. As a result, the information may not accurately reflect the genuine sentiments or beliefs of the respondents.

6. Managerial Implications and Future Agenda

The findings of this study hold significant practical implications for working women investors, financial advisors, policymakers, and educators. By highlighting the influence of anchoring, herding, and loss aversion biases on financial risk tolerance, the study equips women investors with greater self-awareness about how these psychological tendencies shape their investment behaviours. Recognising these biases can help women avoid common investment errors such as relying too heavily on initial price references, blindly following market trends, or refusing to sell loss-making assets due to emotional attachment. Financial advisors can leverage these insights to assess their clients' behavioural profiles better and design personalised strategies that align with their risk tolerance and long-term financial goals. Policymakers may find this valuable research in developing gender-responsive financial literacy programs and regulations encouraging more inclusive participation in financial markets. Additional investigation might focus on financial risk tolerance's role in mediating the relationship between behavioural biases and investment decision-making.

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