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Editorial

Orissa Commerce Association is working consistently with a pious mission to serve the research community of India by publishing 'Orissa Journal of Commerce', a quarterly peer-reviewed research journal for over four decades. The current Issue of the Journal contains twelve research papers and articles from diverse fields of commerce, economics, management, and public policy.

The *first paper* is an attempt to test the influence of foreign capital inflows on BIMSTEC nations' economic growth of BIMSTEC nations during the time 2010-2021 by employing the one-step system GMM method. The *second paper* aims to analyze the role of entrepreneurial education at the university level in enhancing entrepreneurial self-efficacy and fostering entrepreneurial intention among management graduates. The *third paper* investigated the random walk behaviour of energy stocks using ten daily stock prices from January 2015 to December 2022. For this purpose, robustified statistical tests and models were employed, including run test for randomness, automatic portmanteau and automatic variance ratio tests for autocorrelation, and GARCH (1,1) model for volatility clustering.

The *fourth paper* attempted to know the customer's expectation towards after-sales services and its impact on customer satisfaction in automobile industry. The *fifth paper* studied the impact of digitized education on sustainable smart ecosystems, with a focus on institutions in Odisha, India. The *sixth paper* aims to examine how materialism mediates the connection between consumer cosmopolitanism and their intention to make a purchase.

The *seventh article* is a review on different studies done earlier and explored the changes came in online retail because of 3D technology. Theories related with technology describe the different factors which are responsible for the adoption of new technology in online retail environment. The *eighth article* examines the structural relationship between Customer-Engagement, mental accounting, investor attitude, and loyalty for marketable financial products. The *ninth paper* demonstrated that the number of SHGs has risen due to the increased credit disbursement along with the accessibility to various financial services.

The *tenth paper* scanned the global literatures between 1983 and 2022, using fifteen terms related to herd behaviour in finance as keywords to reach the related publications. The *eleventh article* looks at the price trend of spot and futures of a few chosen commodities as well as the macroeconomic variables' effect on the Indian commodity futures market. The *twelfth paper* analyses how different factors influence mobile banking customer satisfaction and switching intention.

The readers will find this Issue with superior quality and high intellectual diversity.

Hope the readers will enjoy reading this Issue and encourage us to stride forward.

Dr. Malay Kumar Mohanty
(Managing Editor)

Foreign Inflows and Economic Growth of BIMSTEC: A GMM Approach

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Remittances, FDI, External debt, Economic growth, Foreign aid

JEL Classification

C23, F15, F35, F34, F 24, P45

Abstract: The study is an attempt to test the influence of foreign capital inflows on BIMSTEC nations' economic growth of BIMSTEC nations during the time 2010-2021 by employing the one-step system GMM method. The data has been taken from WDI, 2022. The outcomes revealed that remittances, FDI, and inflation have an adverse influence on growth whereas debt, openness to trade, population, and aid have an optimistic influence on economic growth. The impact of population, remittance, and foreign is found statistically significant whereas the remaining variables have an insignificant impact. This led all the BIMSTEC countries should revise their policies and strategies regarding openness to trade, usage of external debt, and foreign aid. Various growth theories found foreign inflows an important factor for economic growth. Further accelerating these nations' economic growth will include the adoption and implementation of sound policies, the identification and removal of internal and external hurdles, and other related activities.

1. Introduction

Foreign capital flows have an impact on both developed and developing nations' economic growth. While developing nations require it for expansion and investment, developed countries need it for sustainable development. FDI is a substantial source of funding for emerging nations' development (Singh, 2022). It helps to assist capital formation, technology transfers, trade integration, and create a fair and competitive market, etc. Other than FDI, foreign aid also flows from developed nations to developing countries to fill the three gaps: fiscal gap, savings, and investment gap, and forex gap. Also, countries depend upon borrowings from other countries and international financial institutions to fulfilling the gap between government spending and revenue (Singh, 2022, Nayak *et al.*, 2023; Singh *et al.*, 2023).

Many developing nations generally face a shortage of capital, which can be seen in their individual import-export gap, foreign exchange gap, and savings-investment gaps. In developing nations, three gaps are found mainly: the foreign exchange gap, the savings-investment gap, and the fiscal gap (Bacha, 2011; Bharti and Nisha, 2021). They require an inflow of foreign capital to fill this gap (Bacha, 2011; Singh, 2022, Singh *et al.*, 2023; Vandana and Singh, 2023). So, these countries open up their economies to fulfill the need for capital for various purposes. Foreign capital raised by developing and underdeveloped nations can be in the form of FDI, foreign aid, external debt, FPI, remittances, etc.

Remittances have both direct and indirect impacts on the growth of the recipient nation (Sridi and Guetat, 2020; Zieseemer, 2012). The optimistic impact of remittances can be in the form of an increase in investment and availability of credit whereas a negative influence can be in the form of extravagant spending and disheartening saving (Verma *et al.*, 2021; Saini and Ravinder, 2022).

Developing nations, which have limited savings and income, rely on external debt to fund their initiatives. It leads to rising debt service obligations, which causes the amount of foreign debt to increase and become a burden and a constraint on the developing nation's growth. (Ayadi, 2010). External debt can have both positive and negative impacts on the economic growth of a country. It has an affirmative influence when it is used for developmental purposes such as infrastructure and has a negative influence when used for consumption purposes. If it is used for consumption purposes, it doesn't benefit the government and increases the burden of debt on the government (Tamimi and Jaradat, 2019; Verma *et al.*, 2021).

Foreign aid can be defined as "Government assistance aimed at advancing the welfare and economic growth of emerging nations. Aid can be given directly, from donor to recipient, or it might go through a multilateral organization for development, like the World Bank or the United Nations. Grants, "soft" loans (where the grant component is at least 25% of the total), and the provision of technical help are all examples of aid". Foreign aid may be for different purposes such as education, water supply, development of transport facilities, various services (banking, insurance, energy projects), various industry development projects, tourism, and trade, etc. According to theories of development and empirical evidence regarding developing nations, foreign aid fills resource gaps by increasing limited domestic savings, providing additional foreign aid needed to finance capital requirements as well as imports, assisting with the development of human capital, and boosting domestic capacity (Verma *et al.*, 2021; Singh, 2022, Singh *et al.*, 2023).

For boosting economic growth and expansion of trade and investment, many Asian countries tied up in various regional groups. Similarly, the BIMSTEC group was established in June 1997 as a result of the Bangkok Declaration. BIMSTEC was originally known as BIST-EC and consisted of Bangladesh, India, Sri Lanka, and Thailand. But now in BIMSTEC, there are seven countries.

BIMSTEC is performing well when compared to many regional groups such as the EU, TTIP and SAARC, etc. in attracting remittances in the last few decades. BIMSTEC is also attracting a heavy amount of foreign flows in the form of remittances (WEO, 2022). In comparison to many other regions throughout the world, the region is growing as a competitive economic space when key macroeconomic profile factors are taken into account. BIMSTEC is a less developed and poor-one region and it needs a lot of capital for the development of infrastructure. It is predicted by IMF that it

is also fast-growing and has much potential to grow in the near future (WEO, 2016). It needs foreign capital to fulfill its investment needs (Singh, 2022; Singh *et al.*, 2023).

The association between foreign inflows on recipient countries' economic growth is a burning and controversial issue. Saini and Singhania (2018); Rahman *et al.*, (2019); Adedayo *et al.*, (2020), Ayenew (2022), and Abouelfarag and Abed (2020); Saini and Ravinder (2022); Saini (2022a); Saini (2022b) tested the association of various sources of foreign inflows with nations' growth simultaneously. They found that FDI, remittances, and foreign aid have an important role in determining recipient nations' growth. Whereas the results of Abdullahi *et al.*, (2017) highlighted that foreign inflows have been found negative on the economic growth of 24 SSA nations. Similarly, Ehigiamusoe and Lean (2019), Ayenew (2022), and Duodu and Baidoo (2020) also found the negative effect of overseas loans, foreign aid, remittances, and external debt on development. The result of Ehigiamusoe and Lean (2019) suggests that foreign aid and FDI have an insignificant effect on development.

To test the influence of overseas inflows on the recipient nations' progress, the majority of previous empirical studies like Alege and Ogundipe (2013), Ashurov *et al.*, (2020) and Abouelfarag and Abed (2020) emphasis on a sole pointer for overseas inflows. A fair and true influence of overseas inflows on the growth of receiving nations can be drawn out by the inclusion of more macroeconomic variables. This study has taken four important indicators as a proxy of foreign inflows which are: FDI, External Debt, Remittances, and Foreign aid.

Therefore, the study is an attempt to examine the effect of foreign capital inflows on the BIMSTEC nations' during the time frame 2010-2021 by employing a one-step GMM method for the analysis of data.

2. Review of Literature

To fulfilling the vacuum between saving-investment, export-import, and fiscal income and expenditure, overseas inflows are needed (Bacha, 2011). Foreign capital inflows can be in various forms. FDI is one of the significant forms of overseas capital sources. It helps to assist capital formation, technology transfers, trade integration, and create a fair and competitive market, etc. Similarly, foreign aid helps to improve man force capital by improving infrastructural facilities, healthcare facilities, water and electricity supply, sanitation, etc (Addison and Tarp, 2015). Promotion of investment, increase in demand and supply, and increase in consumption can result from the inflows of remittances (Pradhan *et al.*, 2008). Also, foreign debt helps in fulfilling the financing needs of developing nations for promoting growth (Saini and Ravinder, 2022; Singh *et al.*, 2023). Foreign inflows have not necessarily positive effect always. It has been found that FDI may gathers domestic investment (Markusen and Venables, 1999). Remittances may hurt labour force participation by creating moral hazard problems (Barajas *et al.*, 2009). Sometimes, overseas aid creates a dependency mentality in the recipient nation which can result in a failure by not investing it in productive sectors and mismanagement (Niyonkuru, 2016). Moral hazard issues brought on by remittance inflow could lower the rate of labour force participation (Barajas *et al.*, 2009). Due to debt service obligations, having external debt could also hinder economic growth.

Table 1: Review Summary

<i>Authors</i>	<i>Period</i>	<i>Country and Variables</i>	<i>Methodology</i>	<i>Results</i>
Alege and Ogundipe (2013)	1970-2011	ECOWAS nations; FDI and Economic Growth	System GMM model	Insignificant influence of FDI on ECOWAS nations.
Ashurov <i>et al.</i> (2020)	2000-2017	Central Asian nations	GMM Dynamic model	FDI of previous year, economic growth, participation of labor, openness to trade and tax has been found major determinants of FDI in sample nations.
Saini and Singhania (2018)	2004-2013	20 countries; and the variables are GDP growth, openness to trade, domestic capital etc.	GMM Dynamic model	Economic determinants have a positive impact on FDI and policy-related macroeconomic determinants are major factors attracting FDI in sample countries.
Oladipo (2013)	1985-2010	Nigeria; Money Supply, GDP, Openness to trade, Capital expenses made by the government, FDI, Level of poverty, and Exchange Rate (EXR).	GMM model	Various macroeconomic determinants such as INR, EXR, and openness to trade have been found to be attracting FDI in Nigeria.
Rahman <i>et al.</i> (2019)	1975-2016	Five South Asian nations; GDP growth rate, domestic capital (GCF), remittance-GDP ratio, rate of inflation, FDI-GDP ratio, government consumption expenditure and energy consumption.	Static and Dynamic GMM model	Energy use, domestic capital, and remittances have been found significant variables in determining growth.
Adedayo <i>et al.</i> (2020)	2002-2017	20 Sub-Saharan African countries; Remittances, consumption rate, foreign aid	System GMM model	Foreign aid and remittances have a positive but insignificant impact on private consumption.
Ibrahim (2017)	2010-2015	24 Sub-Saharan African Nations; Domestic capital. GDP, openness to trade etc.	GMM model	foreign capital inflow negatively affects economic growth.

contd. table 1

Foreign Inflows and Economic Growth of BIMSTEC: A GMM Approach

<i>Authors</i>	<i>Period</i>	<i>Country and Variables</i>	<i>Methodology</i>	<i>Results</i>
Daumal (2010)	1989-2002	26 Brazilian states; GDP, inflation, and openness to trade	System GMM model	The liberalization of the nation has a positive impact on growth as it helps to increase per capita income.
Ehigiamusoe and Lean (2019)	1980-2015	Nigeria; FPI, FDI, foreign loans, and foreign aid	ARDL bounds test	External loans have a negative influence on growth whereas the influence of FPI has been found positive. While the impact of aid and FDI has been found insignificant.
Abouelfarag and Abed (2020)	1985-2014	Egypt; FDI, external debt, domestic capital, exports, human capital, technology gap	ARDL bound test	In Egypt, the growth has been positively impacted by foreign investment whereas the effect of foreign debt is negative.
Ustarz and Fanta (2021)	1990-2018	Sub-Saharan African nations	GMM model	Financial growth has a positive influence.
Duodu and Baidoo (2020)	1984-2018	Ghana; Openness to trade, institutional quality, financial development, rate of exchange, and inflation influence technological progress	ARDL model	The impact of remittances has been found positive influence while FDI and debt have a negative influence.
Afridi <i>et al.</i> (2019)	2008-2015	SAARC region; FDI, trade, debt, aid, and remittances.	GMM test	A considerable relationship has been found between foreign inflows on growth.
Ayenuw (2022)	2009-2019	31 SSA countries FDI, remittances, aid, external debt, population, trade openness, domestic capital, inflation, economic growth.	Two-step system GMM model	The impact of aid, debt, and remittances has been found a negative and the positive impact of FDI has been found.
Soomro <i>et al.</i> (2022)	2000-2018	BRICS nations Gross Domestic Product, subscriptions of Telephone, Mobile, Broadband and Internet, Secure internet servers, Trade, and FDI.	GMM model	The stimulus of ICT, FDI, and trade is positive on GDP.

contd. table 1

<i>Authors</i>	<i>Period</i>	<i>Country and Variables</i>	<i>Methodology</i>	<i>Results</i>
Singh <i>et al.</i> (2023)	1976-2020	India Financial development, FDI, Trade Openness and Technological Developments	ARDL	Adverse repercussion of FDI on economic progress

Source: Authors' Compilation

3. Objective and Hypothesis of the Study

After considering the success and failures of overseas capital, it is important to test the influence of foreign capital inflows on the economic growth of BIMSTEC nations'. The study tests the influence of foreign inflows on BIMSTEC nations' economic growth during the time 2010-2021 by employing the one-step system GMM method. the data has been taken from WDI, 2022.

H_0 : *There is not a significant positive association between foreign capital inflows and economic growth in BIMSTEC nations.*

4. Research Methodology

The balanced panel data to inspect the influence of overseas capital flows on the economic growth of BIMSTEC nations has been used. GDP measured in current US \$ is taken as the dependent variable and personal remittances, external debt, foreign direct investment, foreign aid, inflation, openness to trade, and the population are taken as the explained variable. The annual data is taken from WDI 2022, a database of the world bank. The study takes seven BIMSTEC nations by covering a period from 2010-2021.

The explanation of variables and their measurements are displayed in table 2. The model specified is:

$$\begin{aligned}
 GDP_{it} = & \beta_0 + \sum_{i=1}^p \partial_{it} REM_{it} + \sum_{i=0}^p \partial_{it} FDI_{it} + \sum_{i=1}^p \partial_{it} DEBT_{it} + \sum_{i=1}^p \partial_{it} FAID_{it} \\
 & + \sum_{i=1}^p \partial_{it} INF_{it} + \sum_{i=0}^p \partial_{it} TOP_{it} + \sum_{i=0}^p \partial_{it} POP_{it} + \varepsilon_{it}
 \end{aligned}
 \tag{1}$$

Where the subscript i and t refers to country and time, respectively. ε_{it} is the error term.

Pooled OLS, fixed effects (FE), and random effects (RE) models are generally used as standard panel models but these have serious shortcomings. The estimator in a fixed-effects model is assumed to have common slopes and variance in country-specific intercepts. Pooled OLS model imposes slope coefficients and common intercept for all cross-sections, so it is a highly restrictive model (Baltagi, 2008). If some of the regressors are found endogenous and a correlation is found between the explained variable and the error term, the fixed effect model provides biased estimates (Campos and Kinoshita,

Table 2: Variable Description

<i>Symbols</i>	<i>Variable description</i>
FDI	Foreign direct investment, net inflows in terms of current US\$
REM	Personal remittances, received in terms of current US\$
DEBT	External debt taken for long-term in terms of current US\$
GDP	GDP measured in current US\$
FAID	Net official aid received (current US\$)
INF	Inflation, consumer prices (annual %)
TOP	Exports + Imports/GDP
POP	Population, total

Source: WDI, 2023

2008; Singh *et al.*, 2023). The random effects model is found less problematic as it assumes common intercepts.

The only limitation of the random effects model is that it is time-variant. According to this, the error at any time is strictly exogenous and unrelated to the future, past, or present, (Arellano, 1991). Hausman statistics help to make a suitable choice between FE and RE models by investigating whether there is any relation to individual effects or not. To sum up, a major problem in the empirical growth literature is that the static panel techniques fail to account for the dynamic nature of the data. Additionally, these estimators only accommodate structural heterogeneity as random or fixed effects and enforce homogenous assumptions.

When the no. of cross-sections is more than the time period, the GMM estimator works well. GMM techniques have been used to macro panel data in a wide range of recent research, including in the fields of growth, FDI, and financial development.

Therefore, we have used the one-step system GMM for analyzing the panel data as Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). It overcomes the limitations of the difference GMM. The system GMM method is a better method as it considers bias and precision when the series is persistent. The lagged levels of the explanatory variables combine both the first difference and level equations in the system GMM. As a result, the system GMM was used in the study because of its high efficiency and low bias. One-step and two-step system GMM are the two forms of system GMM.

One-step GMM has been used as the variance and covariance matrix provides correct coverage but a two-step estimator was not available and full rank.

5. Data Analysis

The study proceeds with the estimation of preliminary analysis of the variables.

Table 2: Summary Statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Minimum</i>	<i>Maximum</i>
GDP	451152.4	795733.3	1547.991	3176295
FDI	7692.991	14351.99	-4947.47	64362.36
REM	15494.4	23881.5	8.273481	89375.15
DEBT	78880.44	126405.7	919.4053	475076.4
FAID	2.174224	2.518683	-0.26848	9.861695
INF	5.685898	2.832684	-0.90043	11.98939
TOP	0.621793	0.318415	0.219741	1.397294
POP	2.37E+08	4.51E+08	705516	1.41E+09

Source: Authors' calculation

For the studied nations, the average GDP in the current US\$ is 451 billion. Remittance and FDI have a mean value of US\$ 7.69 billion and US\$ 15.50 billion, correspondingly. The average value of foreign aid, in the BIMSTEC nations is 7.39. whereas the average of debt is 32.51.

Table 3 displays the correlation between the various variables. The degree of correlation between the variables can be ascertained with the aid of correlation analysis. The results show that there is some association between the variables, but not much. With the exception of the correlations between remittances and FDI, debt and remittances, and population and GDP, FDI, remittances, and debt, the matrix result only weakly links the model's input variables.

Table 3: Correlation Matrix

	<i>GDP</i>	<i>FDI</i>	<i>REM</i>	<i>DEBT</i>	<i>FAID</i>	<i>INF</i>	<i>TOP</i>	<i>POP</i>
GDP	1.00							
FDI	0.96	1.00						
REM	0.97	0.92	1.00					
DEBT	0.99	0.95	0.96	1.00				
FAID	-0.43	-0.41	-0.41	-0.47	1.00			
INF	0.05	0.06	0.09	0.009	0.27	1.00		
TOP	-0.28	-0.26	-0.05	-0.24	0.16	-0.43	1.00	
POP	0.96	0.92	0.95	0.95	-0.37	0.12	-0.24	1.00

Source: Authors' Calculation

6. Result and Discussion

The outcomes of the one-step GMM show that FDI, external debt, inflation, and openness to trade are statistically substantial, having an impact on the economic growth of BIMSTEC nations. But FDI

and inflation have a considerable deleterious influence on economic growth. Whereas external debt and trade openness have a substantial positive effect. The negative and significant value of FDI shows that an increase of 1 percent in FDI would lead to a 5.38 percent reduction in GDP. It suggests that FDI has an adverse effect on economic growth.

Table 4: Results of One-step System GMM Model

<i>One-step GMM estimation</i>		
<i>Variables</i>	<i>Coeff. Value</i>	<i>p-value</i>
GDP	0.7290029	0.0000
FDI	-5.387913	0.006
REM	-5.326917	0.177
DEBT	3.161317	0.0000
FAID	2.480	0.757
INF	-9.530000000	0.036
TOP	3.00000000000	0.017
POP	182.4294	0.115

Source: Authors' Calculation

The effect of foreign aid, population, and remittances has been found statistically insignificant. The outcomes reveal that remittances have also a negative but insignificant influence on economic growth. A 1 percent increase in remittances would lead to a 5.32 reduction in economic growth. If all other factors remain unchanged, a one percent increase in external debt boosts GDP by 3.16 percent. It is also found that the one percent increase in foreign aid could lead to a 2.48 percent increase in economic growth. Foreign aid has a positive but insignificant influence on economic growth in BIMSTEC nations. Population growth has a positive but insignificant effect on the economic growth of BIMSTEC nations.

The negative and significant influence of FDI on economic growth is similar to the results of Soomro *et al.*, (2022) and Ehigiamusoe and Lean (2019). According to Saini and Ravinder (2022) and Singh *et al.* (2023), even high amounts of FDI are insufficient for accelerating economic growth in a host nation unless that nation has reached the basic stage of development in terms of income, education, and complementing trade policies. As a result, a host country's ability to absorb FDI effectively and channel it towards long-term development is influenced by various factors, and low-income nations are less likely to meet these initial absorptive requirements. Similarly, Soomro *et al.*, (2022) suggested that the government should focus on technology development for proper utilization of foreign direct investment. Singh (2022) and Singh *et al.* (2023) also contended that for the utilization of FDI and its significant contribution to economic growth, the government should focus on technology transfer, human capital, and training of labor for increasing their efficiency, creating safe and stable market opportunities, etc.

The negative and insignificant impact of remittances is similar to the results of Jongwanich (2007) and Salahuddin and Gow (2015). Also, Siddique *et al.* (2012) found that on the economic growth of Bangladesh, no impact of remittances has been found. It can be due to information asymmetry. It means the remitter is not aware of the use of remittances by the recipient. Sometimes, it happens that the recipients do not invest the amount received as remittances in productive projects. Another reason for the negative influence of remittances can be their use for consumption only. One more reason can be the appreciation in the exchange rate. It may reduce the competitiveness of the nation which can lead to increased imports and decrease exports. Therefore, the remittances can affect growth adversely through the rate of forex appreciation (Saini *et al.*, 2022a; Saini *et al.*, 2022b).

The insignificant influence of remittance on growth is opposite to the finding of Abduvaliev and Bustillo (2020), Adjei *et al.* (2020) and Depken *et al.* (2021) who found a positive and significant effect of remittances on economic growth. Shah and Pervin (2012) also found similar results to our results whereas contrary to Safdari and Mehrizi (2012). They also found the positive impact of debt on economic growth. Shah and Pervin (2012) clearly represented that the debt wing needs to be more careful about the investment of debt. The researchers also found that by crowding out private investment or changing the public investment composition, debt impacts growth.

Safdari and Mehrizi (2012) found that the negative impact of external debt on economic growth can be a result of not investing the loan amount in productive sectors, also the extra resources can enter the speculation channels and optimum volume in using loans that were not based on the absorptive capacity of the country. Saini *et al.* (2022a) found that in fact, foreign aid helps to promote growth and reduce poverty. It contributes to growth by increasing public spending and lower domestic borrowings. Burnside and Dollar (2000) observed that if in an economy, there is a good policy environment, the aid can affect growth positively but it doesn't work well in a nation with a low level of technology, development of human capital, and political and macroeconomic stability (Ehigiamusoe and Lean, 2019). The negative influence of inflation on economic growth is similar to Saqib *et al.* (2013). Additionally, the degree to which the recipient nation is capable of absorbing cutting-edge technologies, the level of financial system development, macroeconomic stability, and the level of human capital development could influence how some aspects of foreign capital inflows impact growth (Verma *et al.*, 2021; Singh *et al.*, 2023).

7. Conclusion

This study is an attempt to test the influence of foreign financial inflows on the BIMSTEC nation's economic growth of BIMSTEC countries from 2010 to 2021. The study employed the one-step system GMM estimation method and found that positively significant impact on foreign aid, population, and remittances. While the impact of remittances is inconsiderably negative on economic growth. The impact of foreign aid, population, and remittances has been found statistically insignificant. The outcomes reveal that remittances have also a negative but insignificant influence on economic growth.

The results confirmed the presence of heterogeneity in foreign capital inflows. When forming policies, emerging nations must make advancements in a variety of areas, including the freedom

index, economic openness, and skill-based training for workers to boost technical proficiency and growth rate stability. These advantages should be considered in conjunction with the liberal economic system.

Finally, all the BIMSTEC countries should revise their policies and strategies regarding openness to trade, usage of external debt, and foreign aid. Various growth theories found foreign inflows an important factor for economic growth. Further accelerating these nations' economic growth will include the adoption and implementation of sound policies, the identification and removal of internal and external hurdles, and other related activities.

Additionally, they need to make sure that the external debt, taxes, labour market, and trade openness are all effectively enforced and improved through methods like transparency, flexibility, and others. Additionally, policymakers should be mindful of boosting and consistently maintaining GDP growth.

The outcomes suggest that to induce greater investment, government policies should support easy access to technology. The study's limitation to BIMSTEC nations is one of its drawbacks. Researchers will therefore need to broaden their investigation to incorporate information from developing nations, such as those in South Asia and Southeast Asia.

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The Triple Helix: Education, Self-Efficacy and Intention in Entrepreneurship

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Entrepreneurship, Entrepreneurial education, Self-Efficacy; Entrepreneurial intention, Economic growth

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Abstract: Now-a-days countries worldwide are grappling with challenges across various economic fronts such as employment, trade, financing, economic growth, and a high rate of inflation due to the global pandemic and conflicts. Entrepreneurship emerges as a mean to manage and stabilize the economy. Examining entrepreneurial intention provides insights into the potential pool of future entrepreneurs. This study aims to analyze the role of entrepreneurial education at the university level in enhancing entrepreneurial self-efficacy and fostering entrepreneurial intention among management graduates. The study involved 386 participants from three different universities who had studied entrepreneurship development as part of their curriculum. Using IBM AMOS 26.0 software, the validity and reliability of the sample data are ensured, and the fitness of the model was confirmed through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling. The results show a significant relationship among the triple helix, entrepreneurial education, self-efficacy, and intention. Furthermore, entrepreneurial self-efficacy acts as a mediator between entrepreneurial education and entrepreneurial intention. Consequently, this study suggests enhancing the quality of entrepreneurial education at universities to nurture entrepreneurial intention among students.

1. Introduction

Entrepreneurship has attracted considerable academic focus in the last decade. (Wadhvani *et al.*, 2020) (Jiatong *et al.*, 2021). It stands as a pivotal concern not only in developed nations but also in under-

developed ones, by contributing the enhancement of a nation's economic well-being (Winterstorm Värlander *et al.*, 2020; Yi, 2021). Entrepreneurship is important in promoting economic and social advancement at a national level. (Li *et al.*, 2020; Neneh, 2022).

Current research emphasizes the transformative influence of entrepreneurial education on the entrepreneurial self-efficacy of young talents. It instills entrepreneurial intention, motivating and guiding them toward engaging in entrepreneurial pursuits. (Hu *et al.*, 2018; Jena, 2020; Jingzhou Pan *et al.*, 2018; Kokotsaki *et al.*, 2016). As the number of university graduates rises, the concern over appropriate job searching intensifies within India's higher education system. The GUESSS_2021_Global Report reveals that 17.8% of all students aspire to be entrepreneurs immediately after completing their studies, while a notable 64.9% prefer organizational employment (Mallick and Nayak, 2023; Matta *et al.*, 2022).

Field of study significantly influences entrepreneurial intentions among students, with "Business and Management" and "Science of art" students exhibiting the strongest intentions post-studies at 26.8%. Highlighting the critical juncture of entrepreneurial intentions, the study reports an entrepreneurial intention rate of 18.1% in India. Moreover, 17.1% of Indian graduates pursue entrepreneurship, surpassing the 9.7% rate among non-graduates or less educated individuals. Examining entrepreneurial activity, 14.2% of Indian youth aged 18-34 are involved, showcasing a disparity compared to low-income countries. Among these, the Dominican Republic leads with a 41% Total Early-stage Entrepreneurial Activity (TEA), while Morocco lags at 6.3%, occupying the bottom tier in this comparative analysis.

Individual perceptions serve as a mirror reflecting intentions toward specific goals, particularly in the entrepreneurial context, where they signify the inclination toward seizing business opportunities and initiating ventures. Using five criteria to analyze attitudes and perceptions about launching a business in India yields informative results. Remarkably, 63.1% of people in the nation think they know someone who just started a new career path. A whopping 83% of respondents said there are enough of prospects in their areas. In addition, 82.2% of young people believe it is simple to launch a business in India, and a staggering 86% of people think they have the necessary abilities and expertise to launch a new venture.

Even though persons in India have a good tendency toward entrepreneurship as shown by these three variables, the country's total rate of entrepreneurial intents is 18.1%. This contradiction can be explained by the fact that 54% of people are afraid of launching a new company for both known and unknown causes. One key belief that acts as a deterrent and keeps people from pursuing entrepreneurship, even when they have all the required resources, is the fear of failure. The mechanics of mentality are closely linked to this anxiety.

Understanding the idea of enterprising self-adequacy becomes critical in unraveling this specific characteristic among Indians. Pioneering self-viability exemplifies a singular's faith in their capacity to capably execute different undertakings and exercises related with business venture. This point of view gives significant bits of knowledge into the transaction of discernments, fears, and inspirations inside the pioneering scene in India.

Individual inspiration remains as a pivotal impetus for the foundation of new organizations. The latest information for the year 2021-22 elements obvious review questions pointed toward fathoming the main impetuses behind pioneering pursuits on a worldwide scale. Notably, in the context of India,

the majority of people who want to start their own business do so because there aren't enough jobs. Ninety-five percent of people say this is why they want to be entrepreneurs. This brings to light the stark reality of the high job shortage in India, leading individuals to investigate entrepreneurial endeavors as an option.

This predominant situation frequently brings about need driven business, a peculiarity considered less effective in specific settings. Approximately 6.7 percent of Indian respondents believe that their company will not hire new employees. Besides, the craving to increment work by 1-5 positions is prominently low at 6.9%, with a simple 0.7% of Complete Beginning phase Enterprising Movement (TEA) members communicating the goal to extend their labor force before very long significantly.

To upgrade the effect of business in India, there is a basic need to encourage development driven business venture and supporter for business venture outfitted towards cultural change. According to the GEM_ India_Report 2021-22, this strategic focus has the potential to provide India with long-term advantages, contributing to economic growth, societal transformation, and broader prospects for its citizens (Mohapatra, 2016).

This research intend to search the factors influencing college students' interest in entrepreneurship and how their education in entrepreneurship relates to it (Singla *et al.*, 2023). The goal is to find better ways to encourage college students to consider entrepreneurship as a career path through their education.

2. Review of Literature and Hypotheses Development

Entrepreneurship education (EE) focuses on enhancing students' understanding, abilities, attitudes, and personal qualities related to entrepreneurship. (Liñán *et al.*, 2008). Within universities, EE plays a distinct role by shaping students' attitudes towards entrepreneurship and nurturing their entrepreneurial perspectives, preparing them for different roles in their entrepreneurial journey. A longitudinal study conducted at a British university revealed that students exposed to entrepreneurship education exhibited higher levels of Startup knowledge and motivation compared to their counterparts who did not have such educational exposure (Nabi *et al.*, 2018). Notably, entrepreneurship education significantly enriched students' business knowledge and skills, resulting in a significant increase in their involvement in small business ventures after graduation (Egan *et al.*, 2017; Loy, 2014; Vaughan, 2014).

According to Thompson (2009), entrepreneurial intention refers to an individual's intention to launch a new enterprise and their thoughtful initiatives set for the future. This state of awareness preceding action has significant influence over individuals' decision to pursue new business ventures (Bird, 1988; Nabi, 2010) and is widely considered the most reliable predictor of entrepreneurial behavior (Carsrud and Brännback, 2011; Yang *et al.*, 2021). There has been an increasing focus on examining the entrepreneurial intentions of students in recent academic discussions. (Resa, 2000; Sánchez, 2013; Udayanan, 2019; Zhang *et al.*, 2014). Entrepreneurial intentions are influenced by a range of factors, encompassing personality traits, environmental influences, and demographic variables. (Indarti, 2008; Reynolds *et al.*, 1994). Gender also emerges as a notable determinant, with studies indicating higher entrepreneurial intentions among boys compared to girls (Cohoon *et al.*, 2010; Faloye and Olatunji, 2018; Malach *et al.*, 2010) identified significant influencers of entrepreneurial intentions, including entrepreneurship education, risk-taking ability, and familial and mentor support (Wu *et al.*, 2022).

Strong entrepreneurial intentions are associated with a higher likelihood of entrepreneurial actions (Jha and Mohaptara, 2023). Therefore, educators in entrepreneurship need to provide diverse learning opportunities to cultivate students' entrepreneurial intentions (Bagheri *et al.*, 2013).

H1: Entrepreneurship education significantly affects the entrepreneurial intention

Entrepreneurship education is a topic of significant discussion within the field of entrepreneurship studies, primarily due to its influence on shaping students' intentions to become entrepreneurs. The focus of this education lies in fostering an person's capability to generate notions, nurture originality, and propel novelty to steer a venture into entrepreneurship (Oluseye *et al.*, 2017). Although researchers in higher education and professional institutes acknowledge the crucial part of entrepreneurship education, its influence on nurturing business intentions has been less explored in primary school settings. (Karyaningsih *et al.*, 2020; Wardana *et al.*, 2020). Though, certain experts contend that the introduction of entrepreneurship education in elementary schools is vital for fostering fundamental proficiencies (Floris and Pillitu, 2019). The belief is upheld that EE has an control on students' self-efficacy, as highlighted by (Nowiński *et al.*, 2019). (Agboola, 2021) signifies that the central theme of entrepreneurship education in elementary schools is the promotion of entrepreneurial awareness. As a result, this education becomes crucial not just for disseminating wisdom but also for molding dispositions favorable to entrepreneurship. (Huber *et al.*, 2014). Furthermore, researchers have recorded that the incorporation of outdoor learning activities into entrepreneurship education can additionally boost students' self-efficacy (Fox *et al.*, 2018).

H2: There is a significant relationship between entrepreneurship education and entrepreneurial self-efficacy.

Perceived entrepreneurial self-efficacy refers to an individual's personal assessment of the difficulty or ease in undertaking a specific action, particularly in the context of entrepreneurship (Alshebami *et al.*, 2022). Simply put, it represents an individual's belief in their ability to carry out activities related to creating a company (Krueger and Brazeal, 2018; Liñán *et al.*, 2015; Jha *et al.*, 2019). Studies indicate that individuals with high self-efficacy for a task tend to exert more effort and exhibit greater persistence compared to those with lower self-efficacy (Elnadi and Gheith, 2021) (Bandura and Bandura, 2008; Chen and Greene, 1998).

Scientific evidence underscores that entrepreneurial self-efficacy not only holds a positive influence but stands out as one of the most crucial factors influencing entrepreneurial intention, transcending regional differences (Liñán *et al.*, 2015). According to (Krueger and Brazeal, 2018), it stands as the most significant factor in the establishment of new companies. Consequently, promoting self-efficacy becomes a key focus, and educational reforms designed to foster entrepreneurship in young individuals should target enhancing this perceived self-efficacy. Importantly, promoting self-efficacy involves more than just teaching entrepreneurial skills; it necessitates presenting credible models of behavior and providing psychological and emotional support (Asimakopoulos *et al.*, 2019).

H3: Entrepreneurial self-efficacy has a positive effect on their entrepreneurial intention.

In a previous study (Schmutzler *et al.*, 2019) the significance of self-efficacy in explaining individual entrepreneurial intentions and actions was emphasized. Besides, there is a rising pool of investigation on models that investigate the connection between enterprising expectations and conduct, featuring the critical job of self-viability as a middle person. This variable works both straightforwardly and in a roundabout way in the fields of business venture and social brain research. (Li *et al.*, 2020; McGee and

Peterson, 2019; Newman *et al.*, 2019) The disclosures from these investigations propose that self-visibility is a pivotal determinant that impacts individual conduct through mental cycles, objective setting, and assumptions for results.

In the field of pioneering cognizance, (Burnette *et al.*, According to 2020), self-efficacy is an essential component of the cognitive process. It encourages imaginative reasoning and assists people with pursuing choices while beginning new undertakings. Individual creative thinking in the context of starting new business ventures has been the focus of scholars' attention on the cognitive aspect (Hsu *et al.*, 2019; Schmitt *et al.*, 2018). In their assessment, (Kumar and Shukla, 2022) investigated how imagination and proactive character straightforwardly impact pioneering goal, with enterprising self-visibility playing an interceding job, among college understudies in India.

H4: Entrepreneurial self-efficacy mediates the relationship between EE and EI.

Hypothetical Model

3. Research Methodology

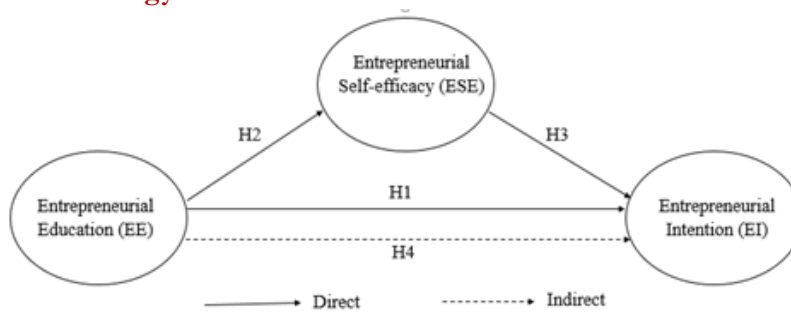


Figure 1: Hypothetical Prototype

Source: Authors' Own compilation

3.1. Sample

Between November 2022 and March 2023, an extensive survey has been conducted across three distinguished universities in Odisha, India. Using a convenience sampling method, our focus was on involving second-year management students who were actively studying entrepreneurial development in their third semester. To maximize accessibility and efficiency, we created a detailed questionnaire distributed through Google Forms. The survey links were thoughtfully shared with class counselors via both Gmail and WhatsApp, accompanied by a polite request to extend the invitation to their respective class groups. This collaborative effort resulted in the collection of a robust dataset, consisting of 386 carefully gathered responses, poised to enhance our study with valuable insights.

3.2. Tools

The research questionnaire comprises two distinct sections. The initial segment captures participants' fundamental information, emphasizing demographic factors pertinent to entrepreneurship research.

The subsequent section encompasses the assessment of EE, ESE and EI. This study predominantly relies on the entrepreneurial self-efficacy scale developed by (Barakat *et al.*, 2014), encompassing a total of 14 items. The entrepreneurial self-efficacy scale exhibits robust internal consistency, with an alpha coefficient of 0.936, a sampling adequacy value of 0.945, and a result of Bartlett’s sphericity test is 0.000 (< 0.05). (Zhang and Zhou, 2023)

To assess entrepreneurship education, the Entrepreneurship Education Scale developed by (Mukhtar *et al.*, 2021) is employed, featuring five questions. The entrepreneurship education scale demonstrates high reliability, with an alpha coefficient of 0.912, a sampling adequacy value of 0.887, and a result of Bartlett’s sphericity test is 0.000 (< 0.05) (Zhang and Zhou, 2023).

The entrepreneurship intention scale, derived from prior research, particularly the work of (Lian and Y, 2009), comprises five questions in total. This scale demonstrates robust reliability, as evidenced by an alpha coefficient of 0.932, a sampling adequacy value of 0.892, and a result of Bartlett’s sphericity test is 0.000 (< 0.05) (S. Zhang and Zhou, 2023). All three scales exhibit reliability coefficients surpassing 0.7, KMO values exceeding 0.7, and significant Sphericity results from Bartlett’s test is below 0.05, confirming their robust reliability and strong Inner coherence structure. Every query item on the scale employs Likert-type scale, ranging from “Strongly Disagree (1)” to “Strongly Agree (5).”

4. Analysis and Interpretation

Table 1: Demography

<i>Sl. No.</i>	<i>Characteristic</i>	<i>Frequency</i>	<i>Percentage</i>
1	Gender		
	Male	226	58.54
	Female	160	41.45
2	Parents’ occupation		
	Business	113	29.27
	Farmer	51	13.21
	Employment (Salary)	184	47.67
	Freelancers	20	5.18
	Others	18	4.66
3	Family Size		
	Below 5	243	62.95
	In Between 5-10	107	27.72
	More than 10	36	9.33
4	Subject		
	MBA	307	79.53
	BBA	79	20.47
5	Name of University		
	GIET University	194	50.26
	Centurian University	101	26.17
	BPUT	91	23.58

Source: Authors’ Own compilation

Measurement Model

The AMOS software was used to conduct confirmatory factor (CFA), and the can be found in Table 2 and Figure 2. The results in Table 2 indicate that all three measurement constructs have satisfactory reliability, with Cronbach’s á values exceeding 0.70 and composite reliability ranging from 0.917 to 0.936— surpassing the recommended benchmark of 0.60 (Bagozzi *et al.*, 1991). In terms of validity, the factor loadings for all measured items stretched from 0.687 to 0.914 (all $p < 0.001$). The AVE values, as shown in Table 2, were also considered satisfactory, ranging from 0.512 to 0.733. Additionally, all measured items’ factor loadings were within the range of 0.687 to 0.914 (all $p < 0.001$) for validity testing. The AVE values were found to be satisfactory, ranging from 0.512 to 0.733 (as shown in Table 2)

For the assessment of discriminant validity, the criteria proposed by (Fornell and f. larcke, 1981) were utilized. The outcomes presented in Table 3 indicate favorable results for the measurement model, with square roots of Average Variance Extracted (AVE) exceeding the values in their respective rows and columns. Additionally, the Heterotrait-Monotrait (HTMT) criterion, with values below the 0.85 threshold, further supports these satisfactory findings. These results were reinforced by the cross-loading analysis.

The outcomes of the fit index are as follows: “ $\chi^2/df = 2.826$, $GFI = 0.865$, $CFI = 0.927$, $NFI = 0.805$, $RMR = 0.043$, and $RMSEA = 0.069$ ”. All of these standards for the measurement model constructs are within adequate ranges, which enables the subsequent analysis of the structural model.

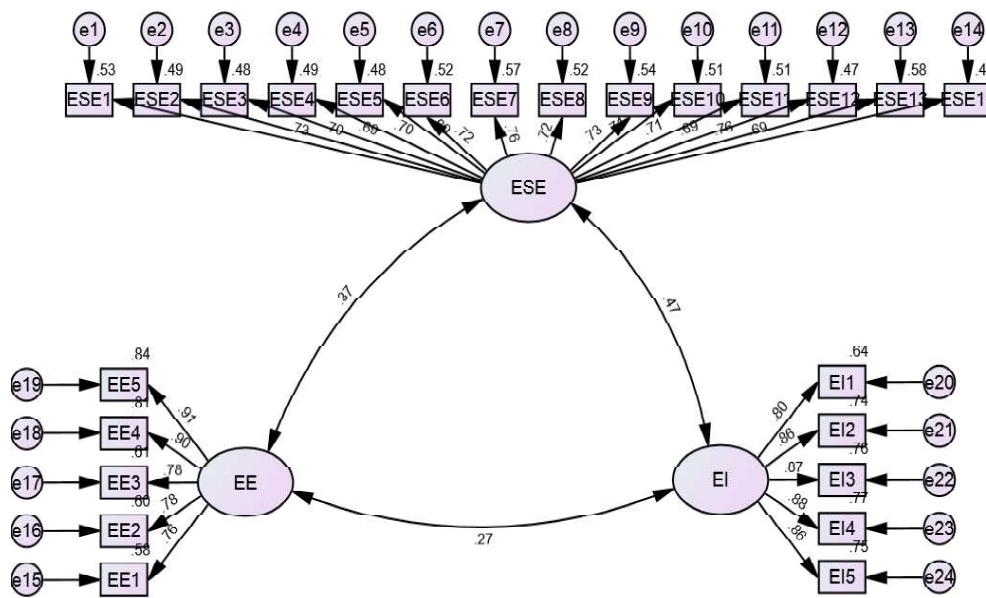


Figure 2: Measurement Framework

Source: Authors’ Own Compilation

Table 2: Confirmatory Factor Analysis (CFA)

<i>Code</i>	<i>Variable/Indicator</i>	<i>Loading</i>	<i>Composite Reliability (CR)</i>	<i>Cronbach's Alpha</i>	<i>Average Variance Extracted (AVE)</i>
1	Entrepreneurial Education (EE)		0.917	0.912	0.689
	EE1	0.763			
	EE2	0.776			
	EE3	0.784			
	EE4	0.898			
	EE5	0.914			
"2	Entrepreneurial Intention (EI)		0.932	0.932	0.733
	EI1	0.801			
	EI2	0.861			
	EI3	0.873			
	EI4	0.880			
	EI5	0.864			
3	Entrepreneurial Self-efficacy (ESE)		0.936	0.936	0.512"
	ESE1	0.729			
	ESE2	0.703			
	ESE3	0.693			
	ESE4	0.696			
	ESE5	0.693			
	ESE6	0.722			
	ESE7	0.758			
	ESE8	0.719			
	ESE9	0.734			
	ESE10	0.712			
	ESE11	0.715			
	ESE12	0.687			
	ESE13	0.762			
	ESE14	0.689			

Source: Author's Own Compilation

Table 3: Discriminant Validity (Fornell-Larcker Criterion)

	<i>CR</i>	<i>AVE</i>	<i>MSV</i>	<i>MaxR(H)</i>	<i>ESE</i>	<i>EE</i>	<i>EI</i>
ESE	0.936	0.512	0.221	0.937	0.716		
EE	0.917	0.689	0.137	0.932	0.370***	0.830	
EI	0.932	0.733	0.221	0.934	0.470***	0.273***	0.856

Source: Authors' Own Compilation

Table 4: Heterotrait-Monotrait Ratio (HTMT) Analysis

	ESE	EE	EI
ESE			
EE	0.391		
EI	0.467	0.289	

Source: Authors' Own Compilation

Structural Model

The Amos 26.0 software package was employed to evaluate the structural model, and the outcomes are illustrated in Figure 3, demonstrating overall satisfaction with the results. Subsequently, we conducted tests on the hypothetical propositions, and the results are outlined in Table 5 and Fig 3. Our analysis discovered that EE had an immediate and notable favorable influence on EI “($\beta = 0.115$, critical ratio = 2.153, $p < 0.031$)”, confirming H1. Additionally, the findings suggested that entrepreneurial education had a straightforward and impactful positive influence on entrepreneurial self-efficacy “($\beta = 0.370$, critical ratio = 6.564, $p < 0.001$)”, thereby supporting H2. Simultaneously, the findings demonstrated that ESE had a direct, positive, and significant effect on EI ($\beta = 0.428$, critical ratio = 7.267, $p < 0.001$), resulting in the acceptance of H3.

The bootstrapping analysis, carried out with a 95% confidence level and based on 5000 samples, aimed to evaluate the mediating role of Entrepreneurial Self-Efficacy (ESE) between Entrepreneurial Education (EE) and Entrepreneurial Intention (EI). The results align with the criteria established by (Preacher and Hayes, 2008), supporting the mediation effect of ESE as indicated in Table 6b and Table 6d. Consequently, the affirmation of Hypothesis 4 (H4) underscores the validity of this mediating influence.

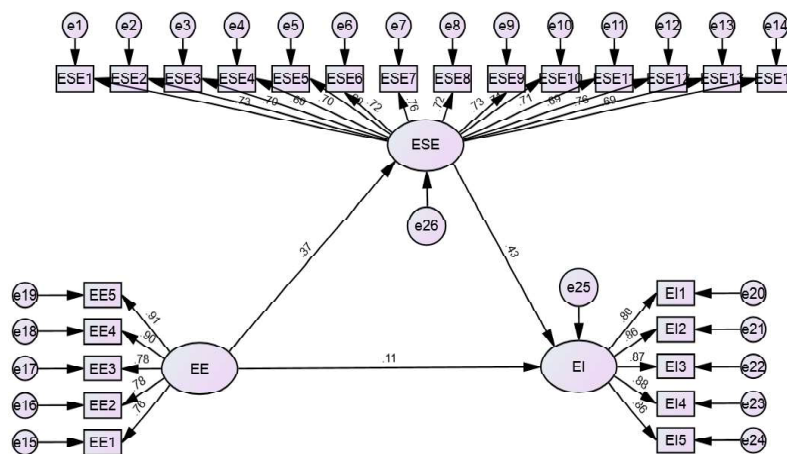


Figure 3: Structural Framework

Source: Authors' Own Compilation

Table 5: Hypothesis Testing

"Hypotheses	Relationships	Un-Standardized Estimate	S.E.	Critical Ratio	P	Standardized Estimate"
H2	ESE ← EE	0.284	0.043	6.564	***	0.370
H1	EI ← EE	0.124	0.058	2.153	0.031	0.115
H3	EI ← ESE	0.601	0.083	7.267	***	0.428

Source: Authors' Own Compilation

Mediation Analysis

To examine the mediation effect of Entrepreneurial Self-Efficacy (ESE) between Entrepreneurial Education (EE) and Entrepreneurial Intention (EI), we employed the bootstrapping method with 5000 iterations, as recommended by (Preacher and Hayes, 2008), This investigation was conducted with a 95% confidence interval.

The confidence interval analysis (Table 6b) revealed a mediating effect with a lower bound of 0.106 and an upper bound of 0.251, excluding zero, indicating the presence of mediation. This illustrates the cumulative effects of entrepreneurial education and entrepreneurial self-efficacy on entrepreneurial intention. To further explore the nature of the mediation, we analyzed the direct effect of entrepreneurial education on intention (0.124) and the indirect effect ($EE \rightarrow ESE = 0.284 * ESE \rightarrow EI = 0.601$) totaling 0.171 (Table 6b) (Wang *et al.*, 2023), with a two-tailed significance of 0.000 (Table 6a). Given the significance of both direct and indirect effects (0.031 and 0.000, respectively), we deduce a partial mediation of entrepreneurial self-efficacy in the relationship between entrepreneurial education and entrepreneurial intention (Praswati *et al.*, 2022). The detailed results of the mediating effect test are presented in Table 6b.

Additionally, we computed the Variance Accounted For (VAF) to ascertain the size of the indirect effect relative to the total effect. With a VAF value of 57.9% (Table 6d) (Pradhan and Gupta, 2020), falling within the range of 20% to 80%, we conclude that there is partial mediation (Elnadi and Gheith, 2021), consistent with the findings that ESE plays a partial mediating role in the connection between EE and EI (Hadi and Abdullah, 2016).

Table 6: Mediating Effect Test

Relationships	Estimate	S.E.	Critical Ratio	P
ESE ← EE	0.284	0.043	6.564	***
EI ← EE	0.124	0.058	2.153	0.031
EI ← ESE	0.601	0.083	7.267	***

Source: Authors' Own Compilation

Table 6a: Indirect Effects

<i>Indirect Effects</i>												
	<i>Lower Bounds</i>			<i>Upper Bounds</i>			<i>Two Tailed Significance</i>					
	<i>EE</i>	<i>ESE</i>	<i>EI</i>	<i>EE</i>	<i>ESE</i>	<i>EI</i>	<i>EE</i>	<i>ESE</i>	<i>EI</i>	<i>EE</i>	<i>ESE</i>	<i>EI</i>
ESE	0	0	0	ESE	0	0	0	ESE
EI	0.106	0	0	EI	0.251	0	0	EI	0.000

Source: Authors' Own Compilation

Table 6b: Mediation Result

<i>Relationship</i>	<i>Direct Effect</i>	<i>Indirect Effect</i>	<i>Confidence Interval</i>		<i>p-value</i>	<i>Conclusion</i>
			<i>Lower Bound</i>	<i>Upper Bound</i>		
EE → ESE → EI	0.124 0.031	0.171	0.106	0.251	0.000	Partial Mediation

Source: Authors' own Compilation

Table 6c: Feeder Data

	<i>Total Effect</i>			<i>Direct Effect</i>			<i>Indirect Effect</i>			
	<i>EE</i>	<i>ESE</i>	<i>EI</i>	<i>EE</i>	<i>ESE</i>	<i>EI</i>	<i>EE</i>	<i>ESE</i>	<i>EI</i>	
ESE	0.37	0	0	ESE	0.37	0	ESE	0	0	0
EI	0.273	0.428	0	EI	0.115	0.428	EI	0.158	0	0

Source: Authors' Own Compilation

Table 6d: VAF Analysis

<i>Path</i>	<i>Total Effect</i>	<i>Direct Effect</i>	<i>Indirect Effect</i>	<i>Variation accounted for (VAF)</i>	<i>Mediation</i>
EE → ESE → EI	0.273	0.115	0.158	0.579	Partial

Source: Authors' Own Compilation

5. Discussion

The study's results affirm the positive influence of entrepreneurial education on entrepreneurial intention, consistent with previous Western research. Notably, entrepreneurial education imparts foundational

knowledge and practical skills, aligning with studies like (Westhead and Solesvik, 2016) and Sun *et al.*, 2017). This discovery provides new insights into the field of Indian entrepreneurial. It furnishes business students with the necessary gifts to begin and achieve their own organizations, distinguish valuable open doors, and develop a proactive innovative outlook.

Besides, the review uncovers that pioneering training emphatically influences understudies' enterprising self-viability, lining up with social mental hypothesis (Albert Bandura, 1985). Students learn more about entrepreneurship as a result of this influence, and they are better able to make informed career choices. In addition, the results demonstrate a significant positive relationship between entrepreneurial intention and entrepreneurial self-efficacy. This suggests that an elevated identity viability upgrades understudies' capacities to perceive valuable open doors and think imaginatively in commercializing clever thoughts.

The concentrate likewise uncovers that connection between pioneering training and innovative goal is decidedly affected by enterprising self-adequacy. It features the significant job of college the executives in directing understudies through pioneering schooling, improving their abilities in business exercises, and establishing a climate that cultivates enterprising self-viability. Thus, people with upgraded enterprising self-viability are better at recognizing valuable open doors and thinking imaginatively with regards to commercializing creative thoughts.

6. Conclusion

The current study on entrepreneurial intention focuses on both entrepreneurial education and entrepreneurial self-efficacy, exploring the relationship between these factors. The results of the analysis confirm the mediating role of entrepreneurial self-efficacy between entrepreneurial education and intention, as indicated by the VAF value of 0.579. This value represents partial mediation and is further supported by the results of bootstrapping methods, with a lower bound of 0.106 and an upper bound of 0.251, both excluding zero. Upon compiling all the analysis results and testing hypotheses, we observed that enhancing entrepreneurial education among university students increases entrepreneurial intention. This, in turn, augments the pool of potential future entrepreneurs for the specific geographical region.

7. Implications and Limitations

Based on our research, we can recommend some practical implications for entrepreneurship development. Entrepreneurial education fosters self-belief, thereby boosting entrepreneurial intention. Firstly, universities across the country should make it mandatory for all students, regardless of their branch or stream, to include entrepreneurship development in their syllabus. Secondly, there is a need to move beyond traditional classroom methods. Thirdly, institutions should engage students with "real-life" opportunities to learn and involve themselves in experimental forms of learning.

While this study provides valuable insights, there are some limitations that present opportunities for future research. The data were collected from students at BPUT, GIET, and Centurion University in Odisha, representing a relatively small sample size from the business department. Future research could explore other regions in India or include students from diverse fields such as vocational schools, IT, and engineering to enhance result generalizability with a larger sample size.

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Testing the Market Efficiency of S&P BSE Energy Stocks in India

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JEL Classification

G11, G14, G17, E44

Abstract: In India, the energy sector contributes significantly to the country's GDP. It is a key driver of economic growth, and it is essential to determine the market efficiency of energy sector in India. The study investigated the random walk behaviour of energy stocks using ten daily stock prices from January 2015 to December 2022. For this purpose, robustified statistical tests and models were employed, including run test for randomness, automatic portmanteau and automatic variance ratio tests for autocorrelation, and GARCH (1,1) model for volatility clustering. The study results illustrated that changes in the prices of energy stocks listed on the S&P BSE Energy are random, indicating that they have random walk characteristics. This study implies that investors could not obtain abnormal profits through the due diligence of stock prices in this efficient market, indicating that past stock returns were not significantly related to future stock prices and returns.

1. Introduction

In the recent years, the Indian stock market has emerged as a rapidly growing force in the global financial landscape (Bhattacharjee *et al.*, 2016; Rohilla and Tripathi, 2022). However, the Indian stock market efficiency is often debated, with some arguing that it is only sometimes efficient due to the influence of various factors such as market speculation and irrational investor behaviour (Panda and Dey, 2022). Within the field of asset price modelling, the Efficient Market Hypothesis (EMH) has garnered significant attention and discussion. The core premise of EMH suggests that stock prices accurately depict publicly accessible information about a company, leading to an efficiently functioning market (Fama, 1965). The EMH exists in three different versions: the weak form, which specifies that past prices and returns have no influence on future prices and returns; the semi-strong form, indicating that publicly available information is reflected in stock prices; and the strong form, implying that both

public and private information is reflected in prices. This weak form of efficiency resembles the random walk theory, suggesting that historical stock data cannot reliably predict future prices (Rohilla and Tripathi, 2022). Technical analysis, which relies on past trends, may need to be more effective for investors. In an efficient market, stocks are assumed to be fairly valued, and their prices closely align with actual value (Mallesha and Archana, 2023). Consequently, the behaviour of stock prices in such markets are random, responding only to new information, making them unpredictable (Chavarkar and Nayak, 2022; Hayek, 1945). The unpredictability of security prices is further influenced by PESTLE factors and the regulatory environment (Pathak *et al.*, 2020). Thus, the efficiency of financial markets vary depending on the sector's characteristics, trading volume fluctuations, information availability, financial instability, and central bank actions (Khuntia and Pattanayak, 2020). Studying various industrial sector's efficiency in India is essential, mainly due to the growing integration of Indian financial markets (Chavarkar and Nayak, 2022; Mohanty *et al.*, 2023). While weak-form efficiency has been extensively studied in various sectors, including banking, pharmaceuticals, insurance, chemicals, and information technology, focusing on specific sectors, such as the Indian energy sector, allows us to uncover nuances and unique characteristics that may not be evident in more generalized studies. Additionally, the Indian energy sector may have its dynamics, regulatory environment, and information flow, which can affect the efficiency differently. Moreover, energy stocks are sensitive to macroeconomic and political developments (Bjørnland, 2022), which makes us an interesting subject for studying the efficiency of energy stocks (Pandey and Mohapatra, 2017)). In this context, the researcher attempts to examine the random walk behaviour of energy stock prices, as this directly impacts investment decisions, risk management, and resource allocation for both individual and institutional investors. Also, it can influence policymakers in safeguarding market integrity and investors' protection through transparent information sharing.

The remainder of the article follows a specific structure, beginning with a review of relevant literature in the second segment. The third portion outlines the objective and hypothesis of the study, while the fourth part describes the methodology used to collect and analyse the data. Empirical results and their interpretation are discussed in the fifth section, followed by concluding remarks in the last section.

2. Review of Literature

The weak form of EMH posits that historical stock market prices do not contain valuable information for predicting future stock prices (Fama, 1970). This concept has been widely studied in various stock markets using multiple stocks, indices and sectors around the world. Guermezi and Boussaada (2016) found that weak form of inefficiency by using banking sector stocks in the Tunisian Stock Exchange. Onwukwe and Ali (2018) found inefficiencies in the Nigeria Stock Market's insurance sector. The VR test was used to analyse the stock prices in Taiwan from 1971 to 1996 to determine if they followed a random walk. Charles and Darne (2009) examined the advancements in using VR tests for testing the random walk and martingale hypothesis in the markets. The study focussed on various versions of the VR test for market efficiency. Said and Harper (2015) examined if the stock returns followed a random pattern. Different statistical methods, including autocorrelation and the VR test, were used for the

Table 1: Previous Studies on Weak Form of Market Efficiency (Sector-Wise)

<i>Authors (Year)</i>	<i>Country/Region</i>	<i>Methodology/Tests Used</i>	<i>Findings</i>	<i>Sectors of the Study</i>
Chavarkar and Nayak (2022)	India	ADF test, runs test, variance ratio test	Efficient	Pharmaceutical sector
Onwukwe and Ali (2018)	Nigeria	Autocorrelation function, Ljung-Box, runs test	Inefficient	Insurance sector
Dimri (2020)	India	Shapiro-Wilk test, Jarque-Bera test, ADF test, runs test, Autocorrelations test	Efficient	Chemicals sector
Ehsan (2021)	Bangladesh	Normality test, Durbin-Watson test, Breusch Godfrey test, runs test, Portmanteau test, variance ratio test.	Efficient	Pharmaceutical sector
Challa <i>et al.</i> (2020)	India	Variance ratio test, unit root tests, ARIMA	Inefficient	Sensex index and IT sector
Guermezi and Boussaada (2016)	Tunisia	GARCH (1, 1) and EGARCH (1, 1)	Inefficient	Banking sector
Kumar <i>et al.</i> (2020)	India	Run test, event study and NAV comparison	Efficient	Pharmaceutical sector
Kok and Munir (2015)	Malaysia	Panel nonlinear unit root test, panel stationarity test	Efficient	Finance sector

Source: Compiled by Authors

analysis. The Russian stock market showed no weak form efficiency during the study. Sadat (2019) examined daily return data from the DS30 and DSEX indices of the Dhaka Stock Exchange. Using various statistical tests such as ADF, Autocorrelation, and VR, indicating a departure from a normal pattern, the study found that the DSE does not efficiently follow the weak form of the Efficient Market Hypothesis (EMH). Chavarkar and Nayak (2022) found that the Indian pharmaceutical stocks are weak form efficiency during the pre-pandemic and pandemic. Dimri (2020) examined the market efficiency of Indian stock market. The paper conducted several tests, including the Shapiro-Wilk test, the JB test, the ADF test, the runs test, and the autocorrelations test. The results showed that the stock market is efficient in its weak form for chemical sector stocks. Srivastava (2007) studied the characteristics of the Indian Stock market, specifically focusing on its efficiency and random walk behaviour. This study utilized the run test, autocorrelation function, and unit root test over a specific time frame. The study revealed that stock market demonstrates weak form efficiency. In contrast, another study by Mishra *et al.* (2015) examined to assess the random walk model for that unit root were applied to the Indian stock market, considering two structural breaks. Tests examining breaks alone do not dismiss

the null hypothesis of a random walk. Yet, a newer heteroskedasticity-aware test reveals mean reversion in stock indexes. Kushwah *et al.* (2013) found that NSE listed stock are efficient in its weak form of efficiency. Kumar *et al.* (2020) investigated the pharmaceutical companies and the Indian stock market are only efficient in the weak form of the efficient market hypothesis (EMH), but not in the semi-strong and strong forms of EMH during the study. Kalsie (2012) investigated a study on market efficiency within the Indian stock market. Employed runs test on the 30-day average prices of companies listed in the Nifty from 2001 to 2007. The results indicated that the share prices displayed random movement for most companies. Khuntia and Pattanayak (2020) found that the Indian foreign exchange market's efficiency changes over time due to factors. This dynamic nature of market efficiency offers opportunities for traders to exploit arbitrage in response to evolving conditions.

3. Statement of the Problem

The weak form efficiency of energy stocks in India is a relatively underexplored area in existing research. While weak-form efficiency has been extensively studied in various sectors, examining specific sectors like the Indian energy stock market unveils unique nuances not evident in generalized studies. This gap is significant given the pivotal role the energy sector plays in the Indian economy and it can impact the stock market's overall performance (Nandy, 2022). Moreover, the energy sector in India is currently undergoing substantial transformations, driven by governmental initiatives promoting the adoption of alternative energy sources and the privatization of state-run energy firms (Shukla *et al.*, 2019; Singh, 2006). Against this backdrop, researcher attempt to investigate the random walk behaviour of energy stocks, inferring its market efficiency. A more thorough exploration of this study could yield valuable insights into the performance of the energy sector prices (Mensi *et al.*, 2021).

4. Objective and Hypothesis

4.1. Objective of the Study

To examine the random walk behaviour of energy stocks, indicating that past price movements offer no predictive insight into future prices.

4.2. Hypothesis of the Study

The main hypothesis of the study is expressed as follows:

H_0 : *The fluctuations in energy stock prices occur randomly.*

H_1 : *The fluctuations in energy stock prices do not occur randomly.*

5. Research Methodology

5.1. Sample and Data

The study used daily closing prices of energy stocks listed on the S&P BSE Energy for the period of January 2015 to December 2022. The sample consists of 10 energy stocks listed on the S&P BSE Energy. These companies are Bharat Petroleum Corporation Ltd, Adani Total Gas Ltd, Coal India Ltd,

GAIL (India) Limited, Gujarat Gas Ltd, Hindustan Petroleum Corporation Limited, Indraprastha Gas Limited, Indian Oil Corporation Ltd, Oil & Natural Gas Corporation Limited, Reliance Industries Ltd. They were chosen based on their total turnover. The data for these stocks were obtained from the BSE website. The daily returns of the energy stocks were determined by using a specified formula:

$$R_e = \ln\left(\frac{P_t}{P_{t-1}}\right)$$

R_e signifies returns of energy stocks; \ln represents logarithm returns; P_t is the energy stocks closing price at time t , P_{t-1} is the energy stocks closing price at time $t-1$

5.2. Methodology

In order to assess the market efficiency of energy stocks in its weak form, one must infer their random walk behaviour. Robustified tests and models were used, namely the Jarque Bera test, run test, automatic portmanteau test, automatic variance ratio test, and GARCH (1,1) model.

5.2.1. Jarque Bera Test

The Jarque-Bera normally test is the most common. The normality test is one of the variable diagnostic tests. This test determines if the observed returns are normally distributed (Jarque & Bera, 1980). To check for normality, use the JB test with the following formula:

$$JB = \frac{n}{6} \left(S^2 + \frac{1}{4}(K-3)^2 \right)$$

S represents skewness, and n signifies sample size.

5.2.2. Run Test

Wald and Wolfowitz introduced the run test as a non-parametric method for determining whether a series of values is randomly distributed or exhibits a certain pattern (Chavarkar & Nayak, 2022). If the calculated Z-value is higher than the critical value (± 1.96) at the chosen significance level, then the series is considered non-random and has a pattern (Kalsie, 2012). The null hypothesis is that observed series are independent and move randomly.

$$\mu_r = \left(\frac{2n_1n_2}{n_1 + n_2} \right) + 1$$

The average number of runs, denoted as m_r , is calculated based on the sum of positive returns (n_1) and negative returns (n_2) in a sequence of counts (r).

$$\sigma_r = \sqrt{\frac{2n_1n_2(n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}}$$

The expected number of runs can have its standard error determined through the use of above-mentioned formula.

$$Z = \frac{n - \mu_r}{\sigma_r}$$

Where Z denotes the standardized variable.

5.2.3. Automatic Portmanteau Test

The automatic portmanteau test, an enhanced version of the Ljung-Box Q statistics, evaluates serial correlation in time series data without relying on assumptions about independence and identical distribution of returns (Escanciano and Lobato, 2009). It determines the optimal lag length, k, using either the Bayesian information criterion (BIC) or the Akaike information criterion (AIC) (Khuntia and Pattanayak, 2020; Lim et al., 2013). The automatic portmanteau test followed as follows:

$$AQ_{\tilde{k}}^* = T \sum_{j=1}^{\tilde{k}} \rho_j^2$$

where T stands for the total count of observations, ρ_j signifies the autocorrelation of order, and \tilde{k} denotes the optimal lag length. This optimal lag length is determined by examining the first \tilde{k} autocorrelations of a time series, which serve as indicators of unpredictability.

5.2.4. Automatic Variance Ratio Test

The variance ratio test (Lo and MacKinlay, 1989) compares the variance of a time series over intervals of length 'k' with 'k' times the variance of the original series. An enhanced version, the automatic variance ratio test (Choi, 1999), selects the holding period 'k' automatically based on data-driven procedures (Lim et al., 2013). In situations with random temporal data, the AVR test ensures equality between the variance of a single period and the variance of the entire period (Khuntia and Pattanayak, 2020). The AVR test statistics under the null hypothesis of no autocorrelation. The AVR test is expressed as:

$$AV(\tilde{k}) = \sqrt{T/\tilde{k}} [VR(\tilde{k}) - 1] / \sqrt{2}$$

With the Variance Ratio (VR) computed is as follows

$$VR(\tilde{k}) = 1 + 2 \sum_{i=1}^{T-1} m(i/\tilde{k}) \hat{\rho}_i$$

In this context, $\hat{\rho}_i$ represents the sample autocorrelation of order i, and m(.) denotes a weighting function with positive and decreasing weights.

5.2.5. GARCH (1,1) Model

The GARCH (1,1) model is a type of statistical model utilized for the examination of financial time series data with the aim of estimating the volatility of the data (Sharma, 2021). The variance formula for the GARCH (1,1) model is outlined as follows.

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$

σ_t^2 is the volatility at time t , ω is the constant, α is the coefficient of the past residuals, β is the coefficient of the past volatility, and $r(t-1)$ is the past residual. If the total of α and β is nearly 1, it implies a strong persistence in the volatility clustering, suggesting market inefficiency (Ganguly and Bhunia, 2021).

6. Empirical Analysis and Results

In situations where the data series exhibits non-normality and heteroscedasticity, the employment of automatic portmanteau and automatic variance ratio tests is advisable (Khuntia and Pattanayak, 2020). The data was analysed using RStudio 2023.09.0, a statistical software.

Table 2: Descriptive Statistics of the Energy Stocks

Energy Stocks	Mean	Minimum	Maximum	Std. Dev.	Skewness	Ex. kurtosis	Jarque Bera	P-value
ATGL	0.0038	-0.1909	0.1823	0.0343	0.5391	4.6695	9920	0.0000*
BPSL	-0.0003	-0.7202	0.1404	0.0291	-9.3479	209.3872	3655	0.0000*
COALINDIA	-0.0003	-0.1567	-0.0003	0.0192	-0.1515	4.0003	1333	0.0000*
GAIL	-0.0008	-0.7183	0.1526	0.0293	-9.6065	206.7636	3566	0.0000*
GUJGASLTD	-0.0002	-1.5367	0.1361	0.0419	-27.2282	996.6314	7505	0.0000*
HPCL	-0.0004	-1.1006	0.1372	0.0364	-14.8742	429.8456	1535	0.0000*
IOC	-0.0007	-0.7209	0.0768	0.0310	-13.0778	283.7710	6716	0.0000*
ONGC	-0.0004	-0.3921	0.1704	0.0237	-2.7903	45.2969	1722	0.0000*
IGL	0.0000	-1.6207	0.1034	0.0414	-30.1684	1178.39	1151	0.0000*
RELIANCE	0.0005	-0.6973	0.1367	0.0241	-12.1667	354.0582	1041	0.0000*

Note: * denotes significant @ 5% level

Source: Authors' estimation

Table 2 contains a summary of the statistical information for energy stocks. The random walk theory assumes that the returns of the series follow a standard normal distribution. However, the data analysis shows that the energy stocks' returns have skewness and kurtosis values that do not align with this assumption. This means that not all stock returns fit a normal distribution. Furthermore, the Jarque-Bera value for the energy stocks' returns is significantly higher than expected under a normal distribution, which confirms that the null hypothesis that all observed returns follow a normal distribution is rejected.

Table 3 presents the outcome of the runs test, which is a statistical approach used to determine the randomness of a data set. The results show that most of the stocks examined have a Z statistic value that falls below the critical value of ± 1.96 , except for IGL. The null hypothesis, which indicates that the observed return series is random, cannot be rejected. Therefore, it can be inferred that the

Table 3: Run Test for Energy Stocks

<i>Energy Stocks</i>	<i>runs</i>	<i>n1</i>	<i>n2</i>	<i>Total Cases</i>	<i>Z Statistic</i>	<i>P-value</i>
ATGL	496	515	515	1030	-1.2470	0.2124
BPSL	996	990	990	1980	0.2248	0.8221
COALINDIA	989	990	990	1980	-0.0899	0.9284
GAIL	989	980	985	1965	0.2485	0.8037
GUJGASLTD	898	902	902	1804	-0.2355	0.8138
HPCL	1034	990	990	1980	1.9332	0.0532
IOC	1032	990	990	1980	1.8433	0.0653
ONGC	989	990	990	1980	-0.0899	0.9284
IGL	1039	990	990	1980	2.1580	0.0309*
RELIANCE	978	990	990	1980	-0.5845	0.5589

Note: * denotes significant @ 5 % level

Source: Authors' estimation

price changes of energy stocks are random, indicating that the fluctuation of energy stock prices is unpredictable, demonstrating that they exhibit efficient market behaviour. It suggests that any specific trend or sequence does not control the prices of energy stocks and instead is impacted by market forces.

Table 4: Automatic Portmantua Test for Energy Stocks

<i>Energy Stocks</i>	<i>Stat</i>	<i>P-value</i>
ATGL	5.9620	0.0146*
BPSL	0.0032	0.9551
COALINDIA	0.1455	0.7028
GAIL	1.2741	0.2590
GUJGASLTD	0.9056	0.3413
HPCL	0.0874	0.7675
IOC	0.2680	0.6047
ONGC	0.1738	0.6767
IGL	2.6613	0.1028
RELIANCE	0.1789	0.6723

Note: * denotes significant @ 5 % level

Source: Authors' Estimation

The outcomes in Table 4 illustrate the results of the automatic portmanteau test conducted on the top ten leading energy stocks. The results showed that most observed returns are not statistically

serially correlated except ATGL. Hence, most of the observed returns exceed the significance level, which leads to failure to reject the null hypothesis (i.e., no autocorrelation). In most energy stocks, there is no autocorrelation between past and current daily returns, indicating that changes in energy stocks are random.

Table 5: Automatic Variance Ratio Test for Energy Stocks

<i>Energy Stocks</i>	<i>Stat</i>	<i>P-value</i>
ATGL	2.7486	0.0440*
BPSL	0.0393	0.8600
COALINDIA	0.2145	0.7320
GAIL	0.6839	0.2580
GUJGASLTD	0.0577	0.5700
HPCL	0.2621	0.6880
IOC	0.3486	0.5740
ONGC	-0.6297	0.9752
IGL	-0.8884	0.2040
RELIANCE	-0.1705	0.6840

Note: * denotes significant @ 5 % level

Source: Authors' Estimation

Table 5 illustrates the outcomes of the automatic variance ratio test. The statistical findings, as presented in the table, indicate that most energy stocks exhibit no autocorrelation, with the exception of ATGL. This leads to the rejection of the null hypothesis, implying that the energy stocks are not autocorrelated. Consequently, the returns of energy stocks are generally not autocorrelated by their lag, indicating that energy stocks operate randomly.

Table 6: GARCH (1,1) Model for Energy Stocks

<i>Energy Stocks</i>	α (ARCH)	β (GARCH)	$\alpha+\beta$
ATGL	0.2712	0.3519	0.6231
BPSL	0.0507	0.9003	0.9510
COALINDIA	0.0544	0.9232	0.9777
GAIL	0.0638	0.9305	0.9943
GUJGASLTD	0.2095	0.4591	0.6686
HPCL	0.2212	0.3892	0.6105
IOC	0.0730	0.9022	0.9753
ONGC	0.0423	0.4391	0.4814
IGL	0.1133	0.6067	0.7200
RELIANCE	0.1067	0.7627	0.8693

Source: Authors' Estimation

Table 6 displays the outcomes derived from the analysis conducted using the GARCH (1,1) model. This model was employed to assess the presence of volatility clustering within the observed time series. The ARCH (1) and GARCH (1) coefficients for BPSL, COALINDIA, GAIL, and IOC are close to one. This posits that these energy stocks exhibit volatility clustering, meaning that their volatility is not random and is influenced by preceding volatility trends. On the other side, the coefficients of ATGL, GUJGASLTD, HPCL, ONGC, IGL, and RELIANCE are not close to one another. Therefore, these energy stocks do not exhibit volatility clustering, and their volatility is more random. Inclusive results indicate that most of the energy stocks are generally non-volatile and not influenced by previous volatility trends.

7. Conclusion

The study examines the efficiency of energy stocks using daily price data from January 2015 to December 2022. Relatively statistical tests and models were employed, including the Jarque-Bera test, run test, automatic portmanteau, automatic variance ratio, and GARCH (1,1) model. The Jarque-Bera test highlights non-normal distribution of energy stock returns. The run test indicates random movement, suggesting no significant relationship between past and future returns. Both automatic portmanteau test and automatic variance ratio test demonstrate a lack of autocorrelation in return series, implying that no serial correlation in energy stocks. The GARCH (1,1) model posits that most of the energy stocks are non-volatile, states that previous volatility does not influence their prices. In conclusion, the study indicated that the fluctuations in the prices of energy stocks listed on the BSE in India are random, meaning that they have random walk characteristics. The study also suggested that in this weak form of market efficiency, investors cannot grab abnormal profits through arbitrage processes. Investors should primarily rely on passive investment strategies and refrain from wasting resources on technical analysis or trying to make profit from past price data, as such methods are unlikely to outperform the market consistently. On the other side, policymakers must maintain market integrity and protect investors by ensuring transparent information dissemination while remaining attentive to systemic risks, as even in a weak form efficient market, regulatory oversight remains essential to safeguard market functioning. The study is limited to ten energy sector companies. A more comprehensive approach involving a wider range of stock prices would have provided more valuable insights for investors. Future research can explore the various factors influencing energy stock prices to enhance predictability.

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Evaluation of Customer Expectation and Satisfaction towards After-Sales Services using Kano Model

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Abstract: An effort has been made in the study to know the customer's expectation towards after-sales services and its impact on customer satisfaction in automobile industry. Data has been gathered from 220 respondents belonging to Punjab. The respondents were asked to answer the questions on the basis of Kano questionnaire. Kano Model and customer satisfaction coefficient is employed to know the customer expectations towards after-sales services and its impact on customer satisfaction. The result indicated that maintenance & repair service, spare parts service, car washing service, inspection service, insurance claim service and pick & drop service are highly expected by the customers of both companies. Overall total customer satisfaction coefficient is found positive only in the case of road assistance & towing service and pick & drop service whereas negative total customer satisfaction coefficient is found in all other services. It is concluded that every company should focus on services as per their customer requirements/expectations.

1. Introduction

In the highly competitive business landscape of today, every company aims for customer satisfaction as its primary and ultimate goal, as it is the key driver of organizational growth. It has always been a matter of priority for the companies. The aim of every company is to create and retain the customers and it is only possible when an organisation try to know about the customer expectation/requirement with their best efforts in the market. There are number of determinants that affects the expectation and satisfaction level of customers in manufacturing and service industry. An intensive understanding of customers' expectations and aptitude is a foundation for a genuine comprehension of customer satisfaction (Mohanty and Das, 2022). Customer satisfaction in manufacturing companies right now isn't just founded on the giving mere products to customers yet in addition in giving excellent after

sales services. Companies provide after-sales services to customers following the sale of their products. These services aim to enhance the overall customer experience by offering support and assistance throughout the product's life cycle, ensuring smooth usage (Gaiardelli *et al.*, 2007). According to Rigopoulou *et al.* (2008) after-sales services involve actions carried out to assist customers following a purchase transaction. Kurata and Nam, (2010) defined after-sales service as a “customer”, “technical”, and “product” support. This significant service is given to the customers to guarantee customer satisfaction with organization's products and services.. Sheth *et al.* (2020) has listed numerous advantage of after-sales services like “competitive advantage”, “customer satisfaction”, “long-term customer relationships”, and “new product creation & success”. In developed countries, much importance is given on after sales service to satisfy the customers because this service not only proves their competitive advantage but also helps the companies in profit generation and customer-retention. According to Jap (2001), customer satisfaction is a set of composition of different dimensions i.e. Brand name, quality of a product, and especially after sale services. Customers now seek more than just the fundamental aspects of a product or service; they are looking for superior quality and satisfaction from the provider. Hence, it is essential for every company to comprehend the requirements of their customers and the assistance provided to them during the post-sales phase. This understanding is crucial for delighting customers and attaining a competitive edge. Customer expectation/requirements towards after sales services is studied due to the developing significance of after sales services which exceptionally impact the satisfaction level of the customers. In this context, Automobile industry has earned a major part of revenue from after sales services especially from the passenger car segment. It play a significant role to boost the economic development of the nation. At present automobile industry is facing stiff competition due to new entrants of domestic and foreign car brands and increasing after sales expectations of customers. Thus, it is crucial for car automobile companies to comprehend the customer's expectation/requirement towards the after sales services to satisfy their customers.

1.2. Customer Expectation and Satisfaction Measuring Model- Kano Model

The Kano Model serves as a framework for prioritizing items within a product roadmap based on their capacity to fulfill consumer satisfaction. Dr. Noriaki Kano of Japan discovered the “Kano Model”, often known as “Kano Analysis,” in 1984. The model emphasizes the non-linear connection between the performance of a product and the satisfaction of the customer. This approach is effective for acquiring a comprehensive grasp of a customer's requirements. It was crafted to articulate a framework capable of recognizing and ranking customer preferences, guiding the product development journey for the manufacturer, and ensuring an increasingly satisfying consumer experience with each purchase from a new product line by the same manufacturer. The Kano model serves as a tool for examining customer preferences and formulating product specifications, facilitating the identification of consumer expectations regarding a given product. The central aim of client requisites diverges from the product's quality characteristics (Rotar and Kozar, 2017). The Kano model for customer satisfaction serves as a valuable instrument for classifying and ranking customer requirements according to their influence on overall customer satisfaction. The Kano model is one of several ways to customer need analysis that has been widely used in businesses as a useful tool for understanding consumer preferences. To include

quantitative indicators into customers' satisfaction, Kano indices are utilised. The Kano model is formed via consumer surveys, in which every product characteristic is signified by a collection of question pairings in a consumer survey. The Kano Model explains the relationship between consumer satisfaction and the fulfilment of consumer needs. Customers have a wide range of expectations for the qualities and features of goods, systems, services, and technology. A consumer may be excited about one element, while another may take it for granted or even abandon a thing because of it. The Kano model helps businesses to pinpoint the product and service features that make customers' hearts skip a beat with delight. With the Kano Model, the most critical factor under consideration when developing a new feature is the extent to which it can bring delight to users. According to the Kano conceptual model, the link between attribute presence or performance and consumer satisfaction is non-linear. This model classifies them as classifying them as:

- **Must-Be: Threshold attributes:** When these characteristics are present, they are taken for granted, but when they are absent, they cause discontent. Customers expect these characteristics and consider them basic. These are the elements that set the product apart from the competition.
- **One-dimensional: Performance attributes:** Satisfaction arises when these criteria are fulfilled, while discontentment is experienced when they are not fulfilled. Customer satisfaction rises as a result of their excellence. Better fulfilment directly correlates with a proportional rise in customer satisfaction, while the absence of or subpar performance of these factors reduces customer sense of satisfaction.
- **Attractive: Excitement attributes:** These traits are often not explicitly communicated by customers and tend to catch consumers by surprise. Customers are exhilarated by the presence of these traits, resulting in elevated levels of satisfaction. Nevertheless, the absence of these attributes does not give rise to dissatisfaction. It is presumed that the latent desires of customers find fulfilment through the exciting features. They aren't often anticipated; thus, they go unheard.
- **Neutral: Indifferent attributes:** These characteristics refer to features that are neither excellent nor negative and do not lead to consumer satisfaction or unhappiness. They do have an impact on decision-making. They have no impact on client satisfaction, either positive or bad.
- **Reverse attributes:** These characteristics pertain to a high level of achievement that leads to discontent, as well as the fact that not every consumer is the same. Some consumers, for example, appreciate high-tech items, whereas others desire the basic model of a goods and will be unsatisfied if it has plenty of additional features.

2. Review of Literature

Gencer and Akkucuk (2017) measured after sales service quality in automobile through Auto SERVQUAL model. It was found that study offer a 28 items scale model which is highly reliable to measure after sales service quality in automobile sector in many countries. Adusei and Koduah (2019) tested the impact of after sales services on customer satisfaction employing Kano Model in CFAO Motors. The research found that customer satisfaction increases when company provides maintenance and inspection after sales services to their customers. Kesh (2020) undertook a study on examining the

influence of after-sales service quality on customer satisfaction within the automobile sector, utilizing the SERVQUAL model. The study found a significant difference among the targeted companies towards the after sales service quality. Golrizgasti *et al.* (2020) assessed after sales service quality in home appliance industry by integrated SERVQUAL model with Kano Model. There was found negative differences towards the all dimensions of SERVQUAL model and were categorised into one-dimensional and attractive categories of Kano Model. Jain *et al.* (2019) evaluated service quality in automobile maintenance and repair industry with the help of modified SERVQUAL questionnaire. The finding of the study elaborated, the dimensions of modified SERVQUAL model are positively correlated with the customer service satisfaction that influence WOM positively. Hsies *et al.* (2015) integrated fuzzy SERVQUAL into improved Kano model aiming to identify the crucial service quality attributes of chain restaurants.. Chain Restaurants should exclude the care free quality to enhance and maintain customer satisfaction which ultimately able to strengthen competitive advantages. Shokouhyar *et al.* (2020) determined the influential factors of after sales service quality on customer satisfaction. SERVQUAL and Kano Model were used to categorise the influential factors of customer satisfaction in after sales service practices. Sheriff *et al.* (2020) found determinants of satisfaction for after sales service in automobile using AutoSERVPERF Model. The study showed that all the dimensions of AutoSERPERF model except tangible to be significant in delivering satisfaction to customers towards after sales service. Balinado *et al.* (2021) studied factors influencing customer satisfaction towards after sales service at Toyota automobile through SERVQUAL approach. Reliability and empathy factors of “after sales service quality” highly influence “customer satisfaction”. Chawla and Singh (2022) identified supportive after sales services expected by the customers which indirectly play essential role to satisfy the customers.

Previous researches have witnessed that many authors have attempted to apply the Kano model across service sector. For example, healthcare sector, banking sector, Education sector etc. But very few studies have made an effort of applying it in the manufacturing sector i.e. automobile sector. Moreover, many author have attempted studies on servqual model to examine the customer satisfaction towards after sales services. An effort has been made in this study to know the customer’s expectation towards after sales services and its impact on customer satisfaction in automobile sector using Kano model. The Kano model serves as a tool for examining customer desires and formulating product specifications, enabling the identification of consumer expectations regarding a product. It involves foreseeing the future needs of customers, determining what should be offered, and identifying what should be avoided to ensure their satisfaction (Maattanen *et al.*, 2014; Agrawal *et al.*, 2023).

The researches has chosen Kano model to know the customer expectation towards after sales service” and its impact on “customer satisfaction” in automobile sector because Kano model has following advantages;

1. It measure customer satisfaction on a specific service to know the importance level of that service by the customers.
2. To know the specific requirement of customers towards the services.
3. To know the customer expectations before actual experience.
4. It can be used with disconfirmation theory.

3. Objective of the Research

The current research aims at evaluating the customer's expectation/requirement towards after-sales services and its impact on customer satisfaction. A comprehensive framework of Kano Model is elaborated in this paper to know the customer expectations.

4. Research Methodology

The research relies on information obtained from both primary and secondary sources. The secondary data has been gathered from published and unpublished sources. The primary information has been gathered from the customers of car automobile companies which are selected on the basis of highest market share or sale data. Top two companies are selected for analysis namely; Maruti Suzuki and Hyundai Motors. The sample of the study has been gathered from the five districts of Punjab namely; "Amritsar", "Jalandhar", "Ludhiana", "Mohali" and "Patiala" which are chosen based on having the highest numbers of authorized service centers for the respective companies. The total 220 customers have been interacted with the help of Kano questionnaire. Purposive sampling has been used to interact the customers in authorized automobile car service centers. Kano Model and Customer Satisfaction Coefficient has been used to analyses the data of the study.

4.1. Kano Questionnaire

Kano questionnaire is designed to know the customer expectations/requirements which includes analytical pair of "functional" (Positive) and "dysfunctional" (Negative) questions about each requirement of customers which help in exploring customers mind that create awareness about actual customer expectations/requirements. Kano questionnaire includes;

1. The Functional question "How do you feel if this feature is present?"
2. Dysfunctional question "How do you feel if this feature is not present?"

The Customers have to choose one of the five possible options to express their state of mind:

- ✓ "I like it"
- ✓ "I expect it"
- ✓ "I am neutral"
- ✓ "I can tolerate it"
- ✓ "I dislike it"

4.1.1. Evaluation Table

The subsequent phase is to summarize the responses of customers using Kano evaluation table. It analyses and categories into customer's requirements as must be (M), one-dimensional (O), attractive (A), indifferent (I), reverse (R), and questionable (Q). The quickest way to evaluate the customer's requirements through the table as shown below;

4.1.2. Defining Category of Service

The categories of the services are assessed through the frequency of customer's responses. The result are interpreted as per the frequency of the answer given to M, O, A, I, R and Q i.e. the maximum value

Table 1: Kano Questionnaire

Customer's requirement		Dysfunctional question				
		I like it	I expect it	I am neutral	I can tolerate it	I dislike it
Functional Question	I like it	Q	A	A	A	O
	I expect it	R	I	I	I	M
	I am neutral	R	I	I	I	M
	I can tolerate it	R	I	I	I	M
	I dislike it	R	R	R	R	Q

Source: Berger *et al.* 1993, Bilgili, 2008,

should be adopted. If, the same two frequency occurred in the results then the subsequent priorities should be taken into account M>O>A>I (Sauerwein *et al.* 1996).

4.2. Customer Satisfaction Coefficient

The Kano Model employs the Customer Satisfaction Coefficient to examine the level of satisfaction or dissatisfaction that customers experience in relation to their specified requirements. It is calculated in the form of percentage of customers who get satisfied or those who do not. It can be calculated with the help of following formulas (Bilgili, 2008)

$$\text{Customer's Satisfaction} = A+O/A+O+I+M \tag{a}$$

$$\text{Customer's Dissatisfaction} = O+M/ (A+O+I+M)*(-1) \tag{b}$$

$$\text{Total Customer Satisfaction} = (a) + (b) = A-M/A+O+I+M$$

The customer satisfaction coefficient, ranging from zero to one, signifies the extent of positive customer satisfaction. A value nearing one indicates a high impact of the service on customer satisfaction, whereas a value approaching zero implies a lesser influence. The customer dissatisfaction coefficient, which is a negative value ranging from zero to minus one, signifies its impact on customer satisfaction. The closer it is to minus one, the greater the influence on customer dissatisfaction due to the non-fulfillment of requirements. Conversely, when closer to zero, it indicates minimal influence, regardless of whether the requirement is met or unmet.

4.3. After Sales Services used in the Study (Variables of the Study)

Secondary sources have been used to identify the after sales services. As shown in the literature, Potluri and Hawariat (2010), Goffin (1999), and Mustofa (2011) have identified after sales services in different sector. In this Study, researcher has tried to identify following after sales services that could be applied in automobile sector based on the finding of above researchers and by EFA. All these after sales services have been used in Kano classification/evaluation;

1. Maintenance and Repair Service

2. Spare Parts Service
3. Warranty Claim Service
4. Inspection Service
5. Car Washing Service
6. Denting and Painting Service
7. Road Assistance and Towing Service
8. Insurance Claim Service
9. Pick and Drop Service

5. Data Analysis and Discussions

This section explores the utilization of the Kano Model in assessing customer expectations and requirements for after-sales services, examining its influence on customer satisfaction within the automobile industry. According to the Kano Model, Customer satisfaction coefficient is used to know the satisfaction or dissatisfaction value of customers with their given requirements. The frequency analysis has been calculated to analyses in which requirements group of the after sales service customer's requirements take place. The results is discussed with the help of frequency analysis of customer's requirements towards the after sales services.

Table 2: Customer Expectations/Requirements towards After Sales Services of Maruti Suzuki Ltd. Using Kano Model

After Sales Services	Customers Expectation/Requirement and frequency						Total	Category
	M	O	A	I	R	Q		
1 Maintenance and Repair Service	50	20	37	3	0	0	110	M
2 Spare Parts Service	56	25	19	10	0	0	110	M
3 Warranty Claim Service	23	53	21	13	0	0	110	O
4 Inspection Service	31	40	30	9	0	0	110	O
5 Car Washing Service	41	37	26	6	0	0	110	M
6 Denting and Painting Service	30	43	23	14	0	0	110	O
7 Road Assistance and Towing Service	28	23	46	12	0	0	110	A
8 Insurance Claim Service	33	50	12	10	0	5	110	O
9 Pick and Drop Service	25	20	45	16	0	4	110	A

Source: Authors' Computation

Table 2 indicated findings of the customer expectations/requirements examination based on the most commonly expressed responses of the customers towards after sales services of Maruti Suzuki Ltd. According to the results, maintenance & repair service, spare parts service and car washing with

the highest frequency of 50, 56 and 41 respectively are found under the category of “must be” requirement, while warranty claim service, inspection service, denting & painting service and insurance service with the highest frequency of 53, 40, 43 and 50 respectively are under “one-dimensional” requirement. In addition, road assistance & towing service and pick & drop service with the highest frequency of 46 and 45 respectively are of “attractive” requirement for maruti and Suzuki customers. The result stressed that Maruti and Suzuki Ltd should give all the necessary attention to the services as per the customer’s requirement to satisfy and make them loyal. The services that come under the “must be” requirement implies that if this requirement is not fulfilled the customers will be extremely dissatisfied but their fulfillment will not increase the customer satisfaction as customers take this requirement for granted. In addition, the services that come under “one-dimensional” requirement implies that customer satisfaction increases with the presence of these services but lead to dissatisfaction if these are not present as customers take this requirement as important. Moreover, the services that come under “Attractive” requirement implies that more satisfaction to the customers if these are present but in the absence, there is no dissatisfaction.

Table 3: Customer Requirements and Customer Satisfaction towards After Sales Services of Maruti Suzuki Ltd

After Sales Services	Frequency	Satisfaction Dimension	Dissatisfaction Dimension	Total Customer Satisfaction
Maintenance and Repair Service	M(50)	0.51	-0.63	-0.12
Spare Parts Service	M(56)	0.40	-0.73	-0.33
Warranty Claim Service	O(53)	0.67	-0.69	-0.02
Inspection Service	O(40)	0.63	-0.64	-0.01
Car Washing Service	M(41)	0.57	-0.70	-0.13
Denting and Painting Service	O(43)	0.60	-0.66	-0.06
Road Assistance and Towing Service	A(46)	0.62	-0.46	0.16
Insurance Claim Service	O(50)	0.59	-0.75	-0.16
Pick and Drop Service	A(45)	0.61	-0.40	0.21

Source: Authors’ Computation

Table 3 showed that the satisfaction dimension column has recorded warranty claim service, inspection service and road assistance & towing service as the top three services of satisfaction with 0.67, 0.63 and 0.62 coefficients respectively while the dissatisfaction column has recorded insurance claim service, spare parts and car washing service as the top three services of dissatisfaction by customers with the corresponding coefficient of -0.75, -0.73 and -0.70 respectively. “Overall total customer satisfaction” coefficient is found positive only in the case of road assistance & towing service and pick & drop service whereas negative total customer satisfaction coefficient is found in all other services. This results suggest that Maruti Suzuki Ltd must should channel its efforts towards improving services with lower or negative total customer satisfaction coefficients and try to better those services which are founded as per their requirement in table 2.

Table 4: Customer Expectations/Requirements towards After Sales Services of Hyundai Motor. Using Kano Model

After Sales Services	Customers Expectation/Requirement and frequency						Total	Category
	M	O	A	I	R	Q		
1 Maintenance and Repair Service	53	34	17	6	0	0	110	M
2 Spare Parts Service	66	20	15	9	0	0	110	M
3 Warranty Claim Service	57	24	20	9	0	0	110	M
4 Inspection Service	31	54	17	8	0	0	110	O
5 Car Washing Service	42	36	25	7	0	0	110	M
6 Denting and Painting Service	49	33	20	8	0	0	110	M
7 Road Assistance and Towing Service	30	40	23	17	0	0	110	O
8 Insurance Claim Service	40	55	11	4	0	0	110	O
9 Pick and Drop Service	23	25	30	27	0	5	110	A

Source: Authors’ Computation

Table 4 indicated findings of the customer expectations/requirements examination based on the most commonly expressed responses of the customers towards after sales services of Hyundai Motors. According to the results, maintenance & repair service, spare parts service, warranty claim, car washing and denting painting with the highest frequency of 53, 66, 57, 42 and 49 respectively are found under the category of “must be” requirement, while inspection service, road assistance & towing service and insurance service with the highest frequency of 54, 40 and 55 respectively are under “one-dimensional” requirement. In addition, pick & drop service with the highest frequency of 30 comes under “attractive” requirement for Hyundai motors customers. The result stressed that Hyundai motors should give all the necessary attention to the services as per the customer’s requirement to satisfy and make them loyal. The services categorized as “must be” requirements indicate that failing to meet these criteria would result in significant customer dissatisfaction. However, meeting these requirements alone doesn’t contribute to increased customer satisfaction, as customers already expect them to be fulfilled. In

addition, the services that come under “one-dimensional” requirement implies that customer satisfaction increases with the presence of these services but lead to dissatisfaction if these are not present as customers take this requirement as important. Moreover, the services that come under “attractive” requirement implies that more satisfaction to the customers if these are present but in the absence, there is no dissatisfaction.

Table 5: Customer Requirements and Customer Satisfaction towards After Sales Services of Hyundai Motor

After Sales Services	Frequency	Satisfaction Dimension	Dissatisfaction Dimension	Total Customer Satisfaction
Maintenance and Repair Service	M(53)	0.46	-0.79	-0.33
Spare Parts Service	M(66)	0.31	-0.78	-0.47
Warranty Claim Service	M(57)	0.40	-0.73	-0.33
Inspection Service	O(54)	0.64	-0.77	-0.13
Car Washing Service	M(42)	0.55	-0.70	-0.15
Denting and Painting Service	M(49)	0.48	-0.74	-0.26
Road Assistance and Towing Service	O(40)	0.63	-0.63	0
Insurance Claim Service	O(55)	0.60	-0.86	-0.26
Pick and Drop Service	A(30)	0.49	-0.45	0.04

Source: Authors' Computation

Table 5 showed that the satisfaction dimension column has recorded inspection service, road assistance & towing service and insurance claim service as the top three services of satisfaction by the customers with 0.64, 0.63 and 0.60 coefficients respectively while the dissatisfaction dimension column has recorded insurance claim service, Maintenance & Repair Service and spare parts service as the top three services of dissatisfaction by customers with -0.86, -0.79 and -0.78 coefficients respectively. Overall total customer satisfaction coefficient is found positive only in the case of road assistance & towing service and pick & drop service whereas negative total customer satisfaction coefficient is found in all other services. These findings indicate that Hyundai Motors should direct its efforts towards improving services that have the lowest or negative total customer satisfaction coefficient and try to better those services which are founded as per their requirement in table 4.

6. Limitations and Future Scope

Following limitations may limit the generalization of the findings of the research. Firstly, our study is limited to only state of Punjab in India which can further be applied to other states or countries also.

Secondly, the results of the study are applicable only to the automobile industry which can diversify to other sectors as well. Third, the study has focused on passenger cars segments and the results may not be valid for other segments in the automobile industry. Fourth, the study has been carried out by taking only two companies of passenger car vehicles which can further be applied to other companies of passenger car vehicles. Fifth, the expectations and preferences of customers may change from time to time. So, the results may need updation in the future. So, the study opens new avenues for future research.

7. Implication

The present study uncovers the requirement of customers towards after sale services in automobile industry using Kano model in an emerging economy. The Kano model serves as a tool for examining customer desires and formulating product requirements, aiming to ascertain what consumers expect from a product. It assists in foreseeing the future needs of customers by determining what should be offered and what should be avoided to ensure their satisfaction (Maattanen *et al.*, 2014). At present the need and expectations of customers towards after sales services in automobile sector changing day by day. So, the findings from the study can be valuable for service providers to understand the need and expectations of customers towards after sales services in this changing business environment. It can help them to anticipating the future requirement of customers towards after sales services on the basis of current expectations. Understanding the requirement of customers towards after sales services is very crucial for the companies to meet expectations of customers as it leads to customer satisfaction as well as customer loyalty which can be profitable to them (Singh, 2006; Rahim *et al.*, 2012; Saleem & Raa, 2014) Moreover, it can be helpful to gain competitive advantages also. Based on the findings of this research, companies can make informed decisions about what to offer and what to refrain from in order to meet the preferences of their customers.

8. Conclusion

The current research is an attempt to know the customer's expectation towards after sales services and its impact on customer satisfaction in automobile sector using Kano model. Customer expectation/requirements towards after sales services is studied due to the developing significance of after sales services which exceptionally influence the satisfaction level of the customers. From the outcomes of the Kano analysis based on the most frequent responses of customers towards after sale services of both companies namely Maruti Suzuki and Hyundai Motors, it is likely to conclude that maintenance & repair service, spare parts service and car washing service are found common under "must be" requirement while inspection service and insurance claim service are found common under "one-dimensional" requirement in the automobile industry. In addition, Pick & drop service is found common under "attractive" necessity in this sector. While there is found different expectations/requirements of customers towards other after sales services in the two companies. It can be concluded that both companies should give all the necessary attention to the services that are common and these services are highly expected by the customers in this competitive business environment, so every company should focus on services as per their customer requirements/expectations.

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Digitized Education Co-creates Sustainable Smart Ecosystem: A Study on Institutions in Odisha

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Keywords

Digital, Education, Sustainable, Ecosystem, Technology

JEL Classification

I25,O3,O4,P3

Abstract: This global phenomenon of technological upgradation and optimization has largely impacted our digitally-poor socioeconomic status. Notwithstanding the government's legislation in India, interventions and moves have practically fallen short to immediately match up to the needs and challenges for creating a sustainable smart ecosystem along with plethora of employment opportunities available. Education is an integral component of sustainable development. In the past decade, digitized education has emerged as a powerful tool to transform traditional education into smart education, which can create sustainable smart ecosystems. This paper presents a study on the impact of digitized education on sustainable smart ecosystems, with a focus on institutions in Odisha, India. The study analyzes the role of digitized education in enhancing the quality of education, promoting eco-friendly practices, and fostering innovation and entrepreneurship. The study also examines the challenges and opportunities of digitized education in creating sustainable smart ecosystems, and provides recommendations for policymakers, educators, and stakeholders to leverage the potential of digitized education for sustainable development.

1. Introduction

Sustainable development is a critical challenge faced by humanity today. The United Nations has identified sustainable development as a universal agenda for the 21st century, which aims to balance economic, social, and environmental concerns to ensure a sustainable future for all. Education is a key factor in achieving sustainable development, as it plays a crucial role in promoting knowledge, skills, values, and attitudes that are essential for sustainable living. However, traditional education systems have been criticized for their inefficiency, rigidity, and inability to meet the evolving needs of society.

Education is an essential tool for human development and a crucial element for creating a sustainable society. With the advancement of technology and digitization, the education sector has undergone significant changes, with a growing emphasis on digital education. Digital education has emerged as an innovative solution that has transformed the traditional education system into a more efficient and effective way of learning. The digitization of education has not only created a smart ecosystem but has also contributed to creating a sustainable society.

Digitized education, also known as e-learning or online learning, has emerged as a powerful tool to address the shortcomings of traditional education systems. Digitized education uses digital technologies such as the internet, mobile devices, and multimedia to deliver educational content and facilitate learning. Digitized education offers several advantages over traditional education, such as flexibility, accessibility, personalized learning, and cost-effectiveness. Digitized education has also been recognized as a means to create sustainable smart ecosystems that promote innovation, entrepreneurship, and environmental sustainability.

Odisha is a state in eastern India with a population of over 45 million. Odisha is home to several institutions of higher education, including universities, colleges, and technical institutes. Odisha has made significant progress in digitizing education in recent years, with the government of Odisha launching several initiatives to promote e-learning and digital literacy. The objective of this study is to examine the impact of digitized education on sustainable smart ecosystems in Odisha.

2. Background

Odisha is a state in eastern India with a population of over 41 million people. The state has made significant progress in the field of education, with a literacy rate of 73.45%. However, the state still faces several challenges, such as poor infrastructure, limited resources, and a lack of access to education for students from remote areas. To address these challenges, the state government has focused on digitizing education by promoting e-learning, online classes, and digital resources.

The digitization of education has not only addressed the challenges faced by the education sector but has also created a sustainable smart ecosystem. The integration of digital technology in education has enabled students to access education from any location, irrespective of physical boundaries. Additionally, digitization has increased access to quality education, thereby reducing the gap between rural and urban education.

The impact of digitized education in Odisha can be studied based on the following parameters:

- **Access to Education:** The digitization of education has made education more accessible to students, especially those living in remote areas. The availability of online resources, e-learning modules, and virtual classrooms has enabled students to access quality education from the comfort of their homes. Additionally, online education has reduced the cost of education, making it more affordable for economically weaker sections of society (Jha and Mohapatra, 2019).
- **Quality of Education:** The integration of digital technology in education has improved the quality of education by making it more interactive, engaging, and practical. The use of multimedia tools, simulations, and interactive games has made learning more fun and exciting.

Additionally, digital technology has made it possible for students to access global education, thereby broadening their knowledge base.

- **Inclusivity:** Digitized education has promoted inclusivity by reducing the gap between rural and urban education. With the availability of online education, students from remote areas can access the same quality of education as students from urban areas. Additionally, digital technology has made it possible for differently-abled students to access education without any barriers.
- **Sustainability:** The digitization of education has created a sustainable ecosystem by reducing the carbon footprint associated with traditional education. With the availability of online resources, students no longer need to travel to access education, thereby reducing the carbon emissions associated with transportation. Additionally, the use of digital technology has reduced the use of paper, thereby contributing to the conservation of natural resources.
- **Efficiency:** The integration of digital technology in education has made the education system more efficient by reducing the time and cost associated with traditional education. The use of virtual classrooms and e-learning modules has made it possible for teachers to reach a larger audience, thereby increasing their efficiency. Additionally, digital technology has reduced the time required for administrative tasks, such as record-keeping and data management.



Figure 1: Digital Ecosystem

Source: www.learn.g2.com

3. Literature Review

The literature on digitized education and its impact on sustainable smart ecosystems is extensive and covers various aspects of the topic. In this literature review, we will highlight some of the relevant studies and research that have been conducted in this area.

According to a study conducted by UNESCO (2019), digital technology has the potential to overcome the barriers to access to education, such as poverty, geographic isolation, and cultural barriers. The study further highlights that digital technology can provide access to education to disadvantaged groups, including girls, refugees, and people with disabilities.

In a study conducted in Odisha, researchers found that the integration of digital technology in education has enabled students from remote areas to access education (Das, 2017; Mohapatra, 2015). The study found that the availability of online resources, virtual classrooms, and e-learning modules has made education more accessible to students, irrespective of their location.

The impact of digitized education on the quality of education has also been extensively studied. According to a study conducted by the World Bank, digital technology has the potential to improve the quality of education by making it more interactive, engaging, and relevant (World Bank, 2019). The study further highlights that digital technology can enhance the learning outcomes by providing personalized learning, adaptive assessments, and instant feedback.

In a study conducted in Odisha, researchers found that the integration of digital technology in education has improved the quality of education (Sahoo *et al.*, 2020). The study found that the use of multimedia tools, simulations, and interactive games has made learning more engaging and practical. Additionally, the study found that digital technology has enabled students to access global education, thereby broadening their knowledge base.

The impact of digitized education on inclusivity has also been studied. According to a study conducted by the European Commission, digital technology can promote inclusivity by reducing the barriers to education for disadvantaged groups (European Commission, 2019). The study highlights that digital technology can provide access to education to people with disabilities, refugees, and migrants.

In a study conducted in Odisha, researchers found that the integration of digital technology in education has promoted inclusivity (Patnaik *et al.*, 2019; Jha *et al.*, 2019). The study found that digital technology has reduced the gap between rural and urban education by providing access to the same quality of education to students from remote areas. Additionally, the study found that digital technology has enabled differently-abled students to access education without any barriers.

According to a study conducted by the International Energy Agency (2020), digital technology can contribute to creating a sustainable society by reducing the carbon footprint associated with traditional education. The study highlights that digital technology can reduce the need for transportation, thereby reducing carbon emissions.

In a study conducted by Bhoi and Patnaik (2019), found that the integration of digital technology in education has created a sustainable ecosystem. The study found that the use of digital technology has reduced the carbon emissions associated with transportation by providing access to education from any location. Additionally, the study found that the use of digital technology has reduced the use of paper, thereby contributing to the conservation of natural resources.

The literature review highlights the impact of digitized education on creating sustainable smart ecosystems. The studies and research conducted in this area demonstrate that the integration of digital technology in education has enabled access to education, improved the quality of education, promoted inclusivity, and contributed to creating a sustainable society. The case studies from institutions in

Odisha provide evidence of the success of digitized education in creating a sustainable smart ecosystem. The literature review also emphasizes the need for further research

4. Case Studies

To study the impact of digitized education in Odisha, we can look at the following case studies:

- Digital Education Initiative by Odisha Government: The Odisha government has launched several digital education initiatives, such as the eVidya program, which provides online education to students from classes 1 to 12. Additionally, the government has launched the Mo School Abhiyan program, which aims to improve the infrastructure of schools by providing digital resources and connectivity. These initiatives have led to a significant increase in the enrolment rate and improved the quality of education in the state.

The program seeks to create a platform for collaboration between the government, alumni, and other stakeholders to contribute to the overall improvement of government schools in Odisha. Some key objectives of the Mo School Abhiyan include:



Figure 2: Mo School Abhiyan

Source: Department of School & Mass Education, Odisha

- Infrastructure Development: Mobilizing resources to address the infrastructure needs of schools, including construction and repair of classrooms, provision of clean drinking water, sanitation facilities, etc.
- Quality Education: Enhancing the quality of education by promoting innovative teaching methods, providing necessary educational materials, and supporting teacher training programs.
- Community Engagement: Involving local communities, alumni, and other stakeholders in the development and improvement of schools to create a sense of ownership and responsibility.

- Alumni Participation: Encouraging former students (alumni) to contribute to the development of their alma maters by providing financial assistance, volunteering, or offering expertise.
- Technology Integration: Introducing and promoting the use of technology in education, such as the provision of computers, internet connectivity, and other digital resources.
- Kalinga Institute of Social Sciences (KISS): KISS is a residential institute that provides education to over 30,000 indigenous students from remote areas of Odisha. KISS is driven by a strong mission to empower tribal communities through education. KISS actively engages with the local community and emphasizes social inclusion. The institution strives to bridge the educational gap and create opportunities for those who might otherwise have limited access to quality education. The institution envisions creating a positive and nurturing learning environment that not only imparts academic knowledge but also fosters holistic development, cultural preservation, and social inclusion. KISS has been proactive in integrating digital technology into its educational framework. This includes the use of online resources, e-learning tools, and other technological innovations to enhance the overall learning experience for its students.



Figure 3: Kalinga Institute of Social Science

Source: www.kiss.ac.in

The institute has integrated digital technology in education by providing laptops, tablets, and internet connectivity to its students. The use of digital technology has not only improved the quality of education but has also enabled students to access education from any location.

- Akshaya Patra Foundation: The Akshaya Patra Foundation is a non-profit organization that provides mid-day meals to over 1.8 million school children across 12 states in India, including Odisha. The organization has integrated digital technology in its operations by using a centralized kitchen system and a GPS-enabled logistics system. The use of digital technology has enabled the organization to increase its efficiency, reduce food wastage, and provide nutritious meals to school children.

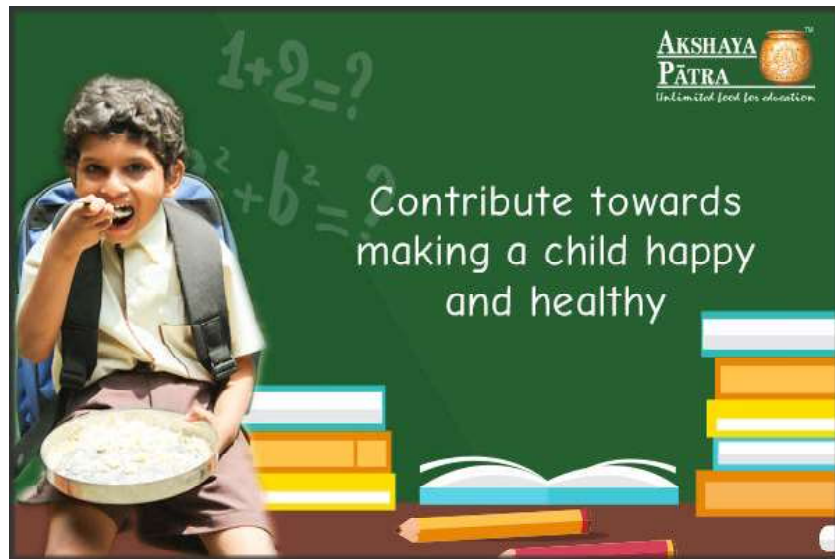


Figure 4: Akshaya Patra Foundation

Source: Akshaya Patra Foundation

The Akshaya Patra Foundation's primary mission is to address classroom hunger and promote education by providing nutritious mid-day meals to school children. The foundation envisions a world where no child is deprived of education due to hunger. One of the key initiatives of the foundation is the Mid-Day Meal Program, which involves providing daily school meals to children in government and government-aided schools. The meals are designed to be nutritious and act as an incentive for children to attend school regularly.

The Akshaya Patra Foundation's Mid-Day Meal Program is known for its scale. It operates centralized kitchens to prepare large quantities of meals, and the foundation's reach extends to various states across India. The program has a significant impact on school attendance, health, and overall child development. The foundation often collaborates with the government, corporate entities, and individual donors. It operates on a public-private partnership model, leveraging support from various stakeholders to fund and execute its meal programs.

Akshaya Patra has been known to incorporate technology in its operations. This includes the use of centralized kitchens with modern cooking facilities and distribution systems, ensuring efficiency and hygiene in the preparation and delivery of meals.

5. Methodology

This study is based on a mixed-methods research design, which involves both qualitative and quantitative data collection and analysis. The study used a purposive sampling technique to select institutions in Odisha that have implemented digitized education. The sample included three universities, three colleges, and three technical institutes. The study used a survey questionnaire to collect quantitative data from

students and faculty members in the selected institutions. The survey questionnaire consisted of questions on the use of digitized education, its impact on the quality of education, the promotion of eco-friendly practices, and the fostering of innovation and entrepreneurship. The study also conducted in-depth interviews with selected stakeholders, including policymakers, educators, and industry experts, to collect qualitative data. The study used thematic analysis to analyze the qualitative data and descriptive statistics to analyze the quantitative data.

6. Results

The study found that digitized education has a significant impact on sustainable smart ecosystems in Odisha. The following are the key results of the study:

- **Enhancing the quality of education:** Digitized education has a positive impact on the quality of education. The study found that students and faculty members perceive digitized education as more interactive, engaging, and effective than traditional education. Digitized education provides students with access to a wide range of learning resources and enables them to learn at their own pace. Faculty members also benefit from digitized education, as it enables them to create and deliver customized content and assess student performance more efficiently.
- **Promoting eco-friendly practices:** Digitized education promotes eco-friendly practices by reducing the carbon footprint of education. Digitized education eliminates the need for physical classrooms, textbooks, and other learning materials, thereby reducing the use of paper, ink, and other resources. Digitized education also enables students to learn from anywhere, reducing the need for travel and commuting. The study found that students and faculty members perceive digitized education as more eco-friendly than traditional education.
- **Fostering innovation and entrepreneurship:** Digitized education fosters innovation and entrepreneurship by providing students with access to cutting-edge technologies and resources. The study found that digitized education encourages students to think creatively, solve problems, and develop entrepreneurial skills. Digitized education also enables students to collaborate with peers and industry experts, thereby fostering a culture of innovation and entrepreneurship.
- **Challenges and opportunities:** The study identified several challenges and opportunities of digitized education in creating sustainable smart ecosystems in Odisha. The main challenges include the digital divide, lack of digital infrastructure, and resistance to change. The main opportunities include the potential to improve access to education, promote digital literacy, and enhance the quality of education. The study recommends that policymakers, educators, and stakeholders should address the challenges and leverage the opportunities of digitized education to create sustainable smart ecosystems in Odisha.

7. Conclusion

The digitization of education has transformed the traditional education system into a more efficient, effective, and sustainable way of learning. The impact of digitized education in co-creating sustainable smart ecosystems can be seen in the case studies of institutions in Odisha. The integration of digital

technology in education has not only improved the quality of education but has also made it more accessible, inclusive, and affordable. Additionally, the use of digital technology has contributed to creating a sustainable society by reducing the carbon footprint associated with traditional education. The success of digitized education in Odisha can serve as a model for other states in India and countries worldwide.

This study provides empirical evidence of the impact of digitized education on sustainable smart ecosystems in Odisha. The study finds that digitized education enhances the quality of education, promotes eco-friendly practices, and fosters innovation and entrepreneurship. The study also identifies the challenges and opportunities of digitized education in creating sustainable smart ecosystems, and provides recommendations for policymakers, educators, and stakeholders to leverage the potential of digitized education for sustainable development. The study concludes that digitized education can play a significant role in achieving sustainable development goalsbank by promoting knowledge, skills, values, and attitudes that are essential for sustainable living.

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Does Consumer Cosmopolitanism Influence the Purchase Intention toward Foreign Products? The Mediation of Materialism

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Keywords

Cosmopolitanism; Materialism; Purchase intention; Mediation

JEL Classification

M31, M38, O1

Abstract: Globalization and increased international trade have given rise to Indian consumers' exposure to foreign products. The present study seeks to explore how consumer cosmopolitanism is linked to consumers' intention to buy products from foreign origins. The research also aims to examine how materialism mediates the connection between consumer cosmopolitanism and their intention to make a purchase. Data was collected using a well-structured questionnaire established through the adoption of various standardized scales of the variables to be studied and demographic variables in Punjab. The analysis was done using the mediation model using the bootstrapping technique after considering various control variables through SPSS and AMOS software. Results of the study indicated significant positive relationship between cosmopolitanism, materialism and intentions toward foreign products. Also Materialism mediates the relationship between cosmopolitanism and purchase intentions. These findings shed light on the influence of consumer cosmopolitanism in emerging markets like India, where materialism may play a key role in translating global orientations into actual purchase behavior.

1. Introduction

The execution of the LPG (liberalization, privatization, and globalization) policy in India by the government stimulated the progression of the Indian economy as the new policy opened the way for international manufacturers to trade in the Indian market. Due to the removal of strict restrictions regarding the entry of foreign brands and approval of foreign direct investment in the Indian market, the rivalry between domestic and global brands grew more intense. To survive in the long run in the present competitive environment, companies have to enlarge their customer base and expand their

markets, reaching both national and international consumers (Aboulnasr, 2007). Due to these reasons, present consumers enjoy various multinational products that are produced with the best technologies and are superior in comparison to various national products (Khare and Handa, 2011). There is also a shift in the attitude and preferences of the Indian consumers from the national brands towards the foreign brands. The past review has recommended that Indian consumers display a higher predisposition toward foreign brands (Gupta, 2011; Guo, 2013; Srivastava *et al.*, 2023; Kinra, 2006). Numerous factors may impact the consumers' intentions toward foreign products, including perceived quality (Kirmani and Baumgartner 2000), which is termed an examination of the brand on the basis of intrinsic and extrinsic indications. There is a possibility that the accessibility of foreign products would bring a visible change in the culture of the consumers, which further increases the prerequisite for a study to analyze the influence of foreign products on Indian consumers' culture (Cayla and Arnould, 2008). Numerous research endeavors have explored consumer attitudes, examining the factors influencing them and their resulting outcomes. Various components of consumer attitude, including beliefs, feelings, and behavioral intentions, and states that all these are highly inter-reliant and collectively influence the consumer's actions. Even, Azjen (1991) confirms the implications by stating that the consumer's behavior is the outcome of the consumer's intentions, so examining the elements influencing consumers' inclinations toward a specific brand is crucial. Various factors significantly affect the consumers' intentions, including the uniqueness of the product (Simonson and Nowlis, 2000). A consumer's success depends on the inimitable image created by consuming the product. So, the consumer would be more inclined toward creating specialness (Tian *et al.*, 2001), which would further affect the choices consumers make while considering a product. The reason for this may be the uniqueness of every individual (Ghazali *et al.*, 2008) and the consumer's intention to be seen differently among the crowd of consumers (Kumar *et al.*, 2009). Kinra (2006) indicated foreign origin is a major reason consumer are more inclined toward foreign brands, and this factor significantly influences consumers' decision-making. So, the removal of restrictions on boundaries between local and global markets has resulted in movements of consumer demand to the global level (Vida *et al.*, 2008).

So, there is a need to study the factors responsible for consumers' increasing intention to purchase foreign brands. This study seeks to explore how consumer cosmopolitanism influences consumer intentions toward foreign brands, focusing on the mediating role of materialism, considering the control of various key demographic variables.

2. Review of Literature

2.1. Consumer Intention

Conventionally, the intention is considered an antecedent of consumer purchase decisions (Abdul and Soundararajan, 2022). Azjen (1991) stated that intention is a motivational factor for consumers that motivates their purchase decisions.

Therefore, it can be asserted that consumer intentions serve as a key indicator of their purchasing behavior. Consequently, marketers and researchers in today's competitive market place significant emphasis on understanding and analyzing consumer intentions (Gupta, 2021).

Gradually, it reveals the degree to which consumers are inclined to try new things and the amount of effort they are prepared to invest in engaging in a particular activity. As revealed earlier, demand for foreign products is growing day by day, and several factors influence consumers' intention toward foreign products, among which perceived quality is the significant one (Kirmani and Baumgartner, 2000; Rao and Monroe, 1989).

2.2. Cosmopolitanism and Consumer Intention

Cosmopolitanism means proclivity to gain knowledge about groups other than their self (Makrides *et al.*, 2022; Friedman, 1990). Consumer cosmopolitanism is termed as openness to the whole world in which consumer is open to foreigners, their cultures, and their products instead of discriminating others on the basis of caste, culture, religion or race (Altintas *et al.*, 2013). Consumers with a cosmopolitan outlook generally exhibit a broad-minded attitude (Srivastava *et al.*, 2023; Riefler and Diamantopoulos, 2009) and try to learn about foreign cultures and their behaviors and preferences and try to adapt themselves as per global standards. Kapferer (1997) stated that prestige drives consumers toward foreign products, and consumers prefer foreign brands to enrich their standing in society because they are cosmopolitan, urbane, and up-to-date. Therefore, it is hypothesized that

H1: Consumer cosmopolitanism has a significant positive influence on purchase intention toward foreign products.

2.3. Materialism and Consumer Intention

Materialism is perceived as a value where individuals gauge success and happiness primarily based on the acquisition of material possessions (Richins & Dawson, 1992; Chan & Prendergast, 2007) and gives central importance to acquiring these materialistic possessions to achieve its goals and desires (Richins, 2004). Belk (1984) hypothesizes materialism as a personality characteristic comprising three dimensions: "possessiveness", "envy", and "non-generosity". Materialistic people are those consumers who are characterized as avaricious, envious, and miserly (Belk, 1984). Materialism motivates consumers to achieve success and self-sufficiency (Kamineni, 2005), which makes consumers work harder to improve their purchasing power and standard of living (Kaur *et al.*, 2022). Therefore, it is hypothesized that

H2: Materialism has a significant positive influence on intention purchase intention toward foreign products.

2.4. Cosmopolitanism and Materialism

Cleveland *et al.* (2009) asserted that consumers from around the world are becoming more inclined toward Western culture. Thus, to improve their standard of living, they are more focused on acquiring the maximum number of foreign-branded products. Materialistic tendencies can vary across different nations (Schiffman *et al.*, 2010), but the common thing is that materialists consume products for non-utilitarian purposes (Richins and Dawson, 1992). So, it can be said that the consumer who is more cosmopolitan would be more inclined to acquire more possession of foreign products (Cleveland *et al.*, 2022). Therefore, it is hypothesized that

H3: Consumer cosmopolitanism has a significant positive influence on materialism.

H4: The relationship between consumer cosmopolitanism and purchase intention toward foreign products is mediated by materialism.

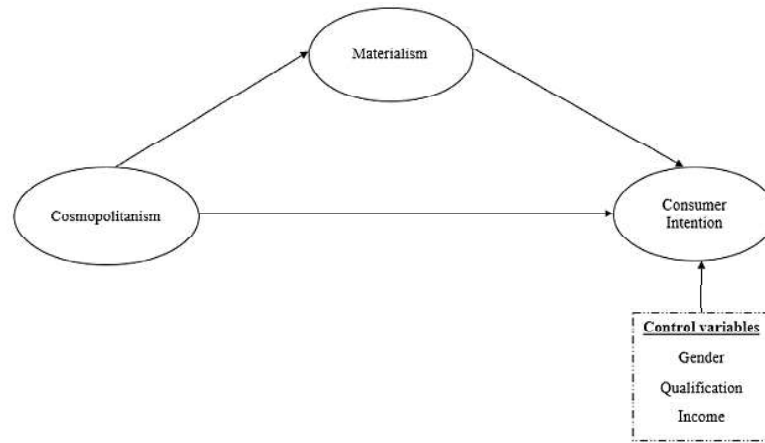


Figure 1: Proposed Conceptual Framework

3. Research Design

3.1. Sampling

Data were collected from millennials of Punjab using a questionnaire survey in which questionnaires were spread online using google form as well as personally at various shopping locations. Out of 278 responses, 229 were further analyzed and the rest were discarded due to omitted data or unengaged responses.

3.2. Instruments

To develop the questionnaire, firstly, data were collected related to demographic profile, and to measure the measures of the key variables adopted by different authors were considered in the current study, which were consumer cosmopolitanism (Das & Mukherjee, 2019), materialism (Richins, 2004), and consumer intention toward foreign products (Vohra & Gupta, 2017). Each scale was assessed using a 5-point rating system, ranging from “strongly disagree” (1) to “strongly agree” (5).

“Exploratory factor analysis” was conducted using principal component analysis to differentiate statements among different key variables to verify the questionnaire’s validity, as Hair *et al.* (1995) proposed. Any statements having factor loadings below 0.5 were excluded, and the rest were included for further analysis (Kline, 2015). Reliability analysis also showed good results depicting Cronbach’s alpha of more than 0.60 (Bernstein & Nunnally, 1994) of all the scales. The following tables show the KMO value and the factor loadings using the “principal component analysis”.

Table 1: KMO and Bartlett’s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.934
Bartlett’s Test of Sphericity	Approx. Chi-Square	2752.246
	df	105
	Sig.	.000

Table 2: Factors Extracted

	<i>Component</i>		
	<i>1</i>	<i>2</i>	<i>3</i>
MAT5	.799		
MAT6	.782		
MAT3	.774		
MAT1	.764		
MAT4	.711		
MAT7	.680		
CCS5		.842	
CCS4		.832	
CCS3		.831	
CCS1		.826	
CCS2		.800	
INT3			.874
INT2			.863
INT4			.834
INT1			.828

Extraction Method: “Principal Component Analysis”.

Rotation Method: “Varimax with Kaiser Normalization”.

4. Data Analysis and Results

The collected data were recorded in SPSS 23 and SEM analysis was conducted using AMOS version 24. A minimum sample size of 200 was acclaimed in past studies, thus validating the sample size (Kline, 2005; Kline, 2015). The bootstrapping technique was used to conduct the mediation analysis model suggested by (Hayes, 2013).

Socio-economic Profile of the Participants

Table 3: The Socio-economic Profile of Participants

<i>Demographic Factors</i>	<i>Sub-Factors</i>	<i>F</i>	<i>%</i>
Gender	Male	133	58.1
	Female	96	41.9
Qualification	Undergraduate	38	16.6
	Graduate	65	28.4
	Post Graduate	73	31.9
	professional/diploma	53	23.1
Income	Less than 2 lakhs	80	34.9
	2 lakhs to 4 lakhs	89	38.9
	More than 4 lakhs	60	26.2

4.1. Correlation Analysis

The following tables depict the mean and standard deviation of the key variables and also the correlation statistics among the variables.

Table 4: Descriptive Analysis

	<i>N</i>	\bar{x}	σ
CCS	229	2.7616	1.20638
MAT	229	2.4738	1.03204
INT	229	2.4672	1.08419
Valid N (listwise)	229		

Table 5: Correlations

		<i>CCS</i>	<i>MAT</i>	<i>INT</i>
CCS	Pearson Correlation	1	.602**	.453**
	Sig. (2-tailed)		.000	.000
	N	229	229	229
MAT	Pearson Correlation	.602**	1	.612**
	Sig. (2-tailed)	.000		.000
	N	229	229	229
INT	Pearson Correlation	.453**	.612**	1
	Sig. (2-tailed)	.000	.000	
	N	229	229	229

** “Correlation is significant at the 0.01 level (2-tailed)”.

The correlation statistics show a notable positive correlation among all variables, indicated by a p-value below 0.5.

4.2. Measurement Model

CFA was employed to evaluate the adequacy of the three-factor model. The model’s validity was scrutinized through the evaluation of “convergent” and “discriminant” validity. To confirm convergent validity, it was required that the factor loadings surpass 0.50, AVE exceeds 0.5 (Fornell & Larcker, 1981), and the composite reliability be above 0.7 (Hair et al., 2010). Discriminant validity, on the other side, necessitated that the “average variance explained” (AVE) surpass the “maximum shared variance” (MSV) and “average shared variance” (ASV) (Hair et al., 2010). Table 6 represents the validity statistics

Table 6: Validity Statistics of Variables

	CR	AVE	MSV	MaxR(H)	ccss	matt	intt
ccss	0.927	0.717	0.424	0.927	0.847		
matt	0.912	0.633	0.468	0.913	0.651	0.796	
intt	0.934	0.779	0.468	0.991	0.506	0.684	0.883

Note: Validity master was used to analyzing the validity, which was fully established

Table 7: Structural Model

Model fit indices	Value	Recommended
CFI	0.95	>.9
RMSEA	0.026	<.08
GFI	0.936	>.9

Table 8: Model Fitness

Model	NPAR	CMIN	DF	P	CMIN/DF
Default Model	42	148.491	129	.115	1.151
Saturated Model	171	.000	0		
Independence Model	18	2877.082	153	.000	18.804

Following the verification of validity and reliability, the suggested model underwent additional Structural Equation Modeling (SEM) analysis. Table 9 illustrates the direct impacts through the depiction of standardized path coefficients.

Table 8: Findings of the Structural Model

Hypothesis	Paths	Beta value	Standard error	Composite reliability	P	Hypothesis results
H-3	MAT <— CCS	.552	.059	9.340	***	YES
H-2	INT <— MAT	.713	.072	9.905	***	YES
H-1	INT <— CCS	.451	.060	7.456	***	YES

Notes: 1. *** indicates “p-value < 0.001”; ** indicates “p-value < 0.01” and * indicates “p-value < 0.05”.
2. INT- Consumer Intention, MAT- Materialism, CCS- Consumer Cosmopolitanism

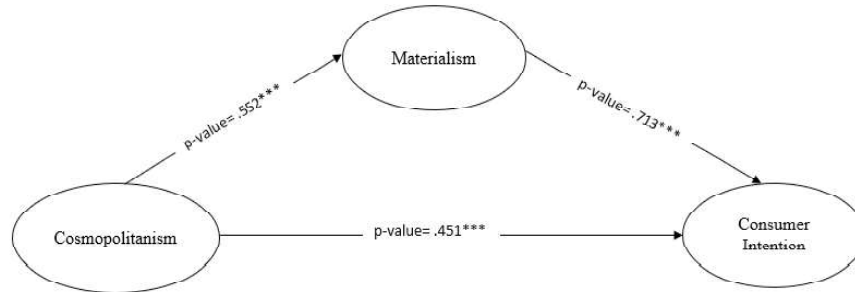


Figure 2: Results of Hypothesised Model

The above table and figure show a strong positive relation between all three variables with p-value < 0.05. The outcomes of the mediation examination are depicted in the following table

Table 9: Mediation Results

Type of effects	Before Mediation test	After Mediation test	Hypothesis
Direct effect of consumer cosmopolitanism on Consumer Intention	Estimate= 0.451 (p-value<.01)***	Estimate= .093 (p-value= 0.150)	Hypothesis 4 accepted
Indirect effect of consumer cosmopolitanism on consumer intention	---	Estimate= 0.401 (p-value = 0.001)***	

Notes: *** indicates “p-value < 0.001”; ** indicates “p-value < 0.01” and * indicates “p-value < 0.05”.

The results depicted in table 9 shows full mediations of materialism between consumer cosmopolitanism and consumer intention toward foreign products as the direct effect of consumer cosmopolitanism on consumer intention becomes insignificant from the significance after the inclusion of materialism as a mediator (Hair *et al.*, 1995; Bolin & Hayes, 2013).

5. Discussion and Implications

The current research attempts to clarify millennials’ purchase intention towards foreign brands and how cosmopolitanism influences their intentions. Results depicted that cosmopolitanism significantly and positively influences the intentions of millennial consumers toward foreign brands and that materialism significantly mediates the relationship between the two variables. Thus, Companies may need to develop and implement global marketing strategies that appeal to cosmopolitan consumers. This could involve emphasizing the international aspects of their products, using diverse and culturally inclusive advertising, and highlighting the global nature of their brand. While cosmopolitan consumers

may be open to foreign products, it's crucial for companies to understand the need for product localization. This involves adapting products to different markets' local preferences and cultural nuances. Understanding the balance between global appeal and local relevance becomes essential. Businesses need to be culturally sensitive and aware of cosmopolitan consumers' diverse backgrounds and values. Insensitivity or cultural misunderstandings can negatively impact consumer perceptions and intentions. Therefore, marketing campaigns and product presentations should be crafted with cultural diversity in mind. The link between cosmopolitanism, materialism, and consumer intention toward foreign products also holds significant practical implications in the realm of global marketing and consumer behavior. Cosmopolitanism, reflecting an openness to diverse cultures and global influences, catalyzes materialistic tendencies. This implies that individuals with a cosmopolitan mindset are more likely to embrace materialistic values.

In turn, materialism becomes a driving force behind consumer intentions toward foreign products. Consumers driven by materialistic values often seek products that symbolize status, luxury, or uniqueness, traits commonly associated with foreign brands. This has practical implications for businesses aiming to expand their market share internationally. Understanding and catering to the materialistic inclinations of cosmopolitan consumers can inform marketing strategies, influencing product positioning, branding, and messaging to align with these values. Moreover, this dynamic highlights the interconnectedness of cultural attitudes, personal values, and consumer choices. Companies can leverage this insight to tailor their marketing campaigns, tapping into the allure of foreignness and the desire for prestige, ultimately influencing consumers' intentions and preferences in a globalized marketplace. As such, businesses can adapt their strategies to resonate with the cosmopolitan-materialistic consumer profile, fostering brand loyalty and driving cross-cultural consumption.

6. Conclusion and Future Scope

In conclusion, this paper delves into the intricate dynamics of consumer behavior in the global market, with a specific focus on the correlation between consumer cosmopolitanism, materialism, and the intention to purchase foreign products. Findings from the study, which gathered data through a well-designed questionnaire in Punjab, reveal a strong positive link between consumer cosmopolitanism, materialism, and purchase intentions towards foreign products. Furthermore, the study presents valuable insights by uncovering materialism as a mediator in the relationship between consumer cosmopolitanism and purchase intentions. These results emphasize the significance of comprehending the interconnectedness of individual values like materialism and behaviors in global consumer markets. As consumer behavior continues to evolve, this research contributes to the ongoing discussion on cross-cultural consumerism and provides a foundation for further exploration in this dynamic field.

A research paper always raises more issues than it resolves, and the present research successfully explored the gap in the relationship between all three variables among millennials, but it also opens the way toward new ways in the same area for the researchers that are to be researched. Future research should focus on consumers of all age categories to verify whether the results vary among different age groups, and the scope of the study should also be expanded based on a geographical area as this research is restricted to the area of Punjab only. Marketers focusing on domestic products should

focus on the factors responsible for raising cosmopolitan qualities among consumers to develop strategies to survive the competition from foreign brands.

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3D Technology in E-tail: A Synthesis through Literature Review

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Abstract: As online shopping continues to gain popularity, retailers are finding new ways to enhance the customer experience. One of the latest innovations is the use of 3D technology to showcase products. This study is based on secondary data, different studies done earlier were reviewed and explored the changes came in online retail because of 3D technology. Theories related with technology describe the different factors which are responsible for the adoption of new technology in online retail environment. The objective of this study is to shed light on use of different facets of 3D technology in virtual retailing differently. Researchers observed that now a days, 3D is used with other metaverse technologies i.e. augmented reality and virtual reality to enhance customer experiences. This study might provide a good conceptual ground to marketers, online retailers and technology developers to get the best practical implication of this new emerging technology in this era of digitalization.

1. Introduction

In the coming years, the scope of e-commerce will get a boom in the Asian region and India is the fastest-growing e-commerce market in this region, which means there will be huge scope for e-commerce in India. Internet users are expected to increase over 1.48 billion in 2030 and 1.6 billion in 2050 (Basuroy, 2023). The Indian e-commerce sector is projected to reach USD 200 billion by 2026, USD 350 billion by 2030 (ibef, 2023). “The backbone of any good business model for the retail industry should address four catalysts that drive disruption: economy, enabling technology, platforms and consumer mindset” (Deloitte, 2017). Now a day many e-tailers are adopting new ways to lure customers that results in their engrossing in the digital world because of more interactivity and vividness. Some other e-tailers like amazon, flipkart and pepperfry are adopting 3D view technology to attract more and more customers.

Visual presentation of products in e-platform influences the decision making of consumers because visual senses play a major role in e-tailing. In today's era, wily e-commerce dealers provide product presentations in such a way that consumers can see it from all angles, zoom in and see videos (Choi and Taylor, 2014). Product presentation affects mental imagery in the online environment (Yoo and Kim, 2014). Mental imagery described as a process of representation of non-verbal information (Gavilan *et al.*, 2014), stimulation in the customer's imagination (Ha *et al.*, 2019). Mental imagery is the process of representation of "sensory or perceptual experience" in human mind in terms of "ideas, feelings and memories" (Yoo and Kim, 2014). It consists of three basic dimensions which are "vividness, quantity and elaboration" (Gavilan *et al.*, 2014), two dimensions "quality and elaboration" (Ha *et al.*, 2019; Yoo & Kim, 2014). Rathee and Kumari (2022) revealed that virtual try-on technology of product presentation positively influences all the three dimensions of mental imagery namely "vividness, elaboration and quantity".

Liberman and Trope (1998) proposed construal level theory, according to which there are two categories of mental representation: concrete and abstract. Concrete mental representation focuses on the subordinate nature of products like "attributes, smells, tactile and color". On the other hand, abstract mental representation's focus is on super-ordinate nature like "price and overall impression" (Liu *et al.*, 2017). Concrete pictures provide greater elaboration that affects mental imagery which facilitates more product experience in the virtual environment (Yoo and Kim, 2014). Mental imagery act as a mediator between "type of ad and ad trust" and have a significant impact on purchase intention (Gavilan *et al.*, 2014), a positive attitude through positive affect (Ha *et al.*, 2019). It makes one able to get the same experience as they get in the real world while touching the products. Stimulus of mental imagery is the most important when one cannot touch products. More product image on an online platform leads to perceptual-reenactment that stimulates customer's senses and helps to fill missing features of products (Spence and Deroy, 2013) like olfactory and gustatory and desire to touch it.

3D advertising gives a more favorable result for geometric products. It can be partially good for material products because 3D advertising creates more vividness in mental imagery that results in "tactile illusion" which satisfies the need for touch and "develop concrete mental model" which stimulates experience like a product is in the real world. As per the Transportation Imagery Model, 3D experiences result "more vivid and realistic product imagery and more favorable attitude" (Choi and Taylor, 2014). E-tailers are turning toward 3D product presentations to get a competitive advantage and provide more sensory experiences to customers. The Internet is just a channel that helps in advertisement, distribution and marketing, but its efficiency is increased if there is more interactivity and good multimedia presentation (Edwards & Gangadharbatla, 2001). While utilising 3D technology during the goods display instead of 2D technology, customer engagement rises by 66% (Melnyk, 2019). Even though, there is scarcity of studies in the context of 3 dimensional technologies, even if it provides lots of benefits. Ambika *et al.* (2023) mentioned that as compared to virtual reality (VR) 39% and augmented reality (AR) 37% studies, only 12% studies were conducted on 3D product presentation.

The objective of this study is to synthesize the available literature of 3D technology and contribute in online and sensory marketing literature by providing the deep insight about customer behavior in

technological era. The outcome of this study may be helpful for technology developers as well as retailers in understanding consumer behavior and their needs in current scenario.

2. Conceptual Background

2.1. 3D

Raed S. Algharabat and ElSamen (2013) defined “3D product presentation” as a “psychological state in which virtual objects presented in 3D are perceived by consumers as actual objects, which convey to customers relevant product information that helps them in understanding and evaluating the quality and performance of products sold online.” 3D images have higher persuading power than 2D images (Choi and Taylor, 2014).

3D product presentation quality is a multidimensional construct. Website quality and 3D product presentation quality affect the consumer’s perception. “E-shopping quality refers to the overall consumer perception of the excellence and effectiveness of an e-tailer’s product and/or service offering through its virtual store.” Website features, quality and performance influence the perception of consumers toward e-shopping. Product presentation in 3D technology affects the psychological as well as the emotional state of users that creates a good virtual product experience (VPE). Customers’ ability to feel, touch and to try product increases if 3D has high product presentation quality. 3D also increases attitude, purchase intention and knowledge of consumers. The level of interactivity and vividness enhance telepresence, which affects the quality of 3D (Algharabat *et al.*, 2017). 3D virtual model increases the consumers “telepresence and image interactivity” that provide more information regarding “touch and feel or fit” (In Shim & Lee, 2011).

The technology of VPE is divided into two types: “visual control and functional control”. Visual control means “software which allows consumers to move, rotate and zoom in and out a product’s image, see it from different angles, distances and perspectives”. Functional control means “software which enables consumers to simplify different functions of products through their computers”. Antecedents like “information quality, system quality, authenticity and enjoyment” affect the quality of 3D. 3D-Q has a significant influence on both “attitude toward website and attitude toward presented product”. These attitudes have a significant influence on the users’ satisfaction which is moderated by the VPE (Algharabat *et al.*, 2017). Internet shopping trust is a moderating variable to reduce the perceived risk, because shopping experience increases the level of trust among customers which further influence risk perception. Consumer’s model can be generated by them in 3D virtual model by their body size and they can get the fit related information. So their actual body size work as a moderating variable and helps to reduce risk (In Shim & Lee, 2011).

The novelty of 3D product has positive outcomes; it enhances “sense of enjoyment” that leads to “loss of self-consciousness”. The product presented in 3D provides more indirect experience than traditional media does. Novelty of 3D can process information in such a way that distract one’s attention from the internal state and increase focus on the environmental stimuli, which leads to more information processing. Curiosity and more information seeking is the behavior of customers. 3D presentation with information has a significant effect on attitude toward the website (Edwards & Gangadharbatla, 2001).

3D presentation enhances “sense of enjoyment” and online experience by increasing interactivity (Edwards & Gangadharbatla, 2001). 3D emerges as a new technology for presentation of product which enables customers to see the shape and surface of a product so they can imagine it. Interactivity enhances vivid mental images of different sensory modalities “taste, touch and smell” and vividness leads to mental stimulation that helps to increase purchase intention. According to different studies 3D interactivity positively influences brand attitude, product knowledge, purchase intention and revisit intention by zooming and rotating product in any direction and provide more vivid mental imagery (Choi and Taylor, 2014). In comparison to the three-dimensional virtual reality condition, respondents’ purchase intentions were higher in a three-dimensional web condition (Kang *et al.*, 2020).

2.2. Theoretical Support in Technology Acceptance

The technological acceptance model describes the different factors which are responsible for the adoption of new technology in online retail environment. The adoption theory aims to explain different important factors that push peoples to make a specific behavior. Fishbein and Ajzen (1975) developed the first model of adoption theory that is “theory of reasoned action (TRA)”. According to this model, the intention is determined by attitude and subjective norms attached to the behavior. Intention works as a predictor that predicts shoppers’ behavior. The theory of planned behavior is another model proposed by Ajzen in 1991. In this model, a new construct is added in TRA that is “perceived behavioral control”. According to this model “Individuals’ perception of control, attitude toward behavior and subjective norm” influence the intention that leads to a particular behavior (Dang and Pham, 2018). While purchasing goods online customers’ purchase intention was higher in case of higher “perceived behavior control” as compared to low level of “behavioural control” (Abdul and Soundararajan, 2022). Gupta (2021) stated that “perceived behavior control” is a strong predictor of green purchase intention among youth towards green product. Different researchers use this model to study the acceptance of individuals and use of different information technologies like advertising, shopping and mobile services (Ghazali *et al.*, 2018).

In 1989 Davis proposed another model, TAM (Technology Acceptance Model). This model depicts that to adopt a particular technology; individuals’ intention is determined by belief. Belief included two variables named “perceived ease of use and perceived usefulness”. Perceived ease of use means “the degree to which an individual believes that using a particular system would be free of physical and mental effort” (Davis, 1989). Perceived usefulness means “the degree to which an individuals’ believes that using a particular system would enhance his or her job performance” (Davis, 1989). Acceptance or rejection of technology depends upon the enhancement of people performance by technology, not by the effort increasing to perform that function (Dang and Pham, 2018).

Different customers have different views regarding the acceptance and non-acceptance of technological development. As the new product visualization technology emerges, retailers’ adoption of technology is not as important as customers’ adoption and usage of new innovative technologies. Traditionally TAM is a tool to examine the disparity “between the technological innovations which both consumers and organisations are expected to use and those that they will accept and use”. PEOU (perceived ease of use) and PU (perceived usefulness) are the key factors. PU enhances customers’

activities and PEOU means easiness in using a system. Individual differences, attitude and characteristics are external variables that influence PU and PEOU (Bonetti *et al.*, 2018).

In another study, different factors are studied which influence customer's intention, because a mobile shopping has many advantages. Despite this use of m-shopping was low in Malaysia. The researcher "integrate TAM and TPB (theory of planned behaviour) with PI (purchase intention) and trust in a framework" to study the intentions of Malaysian shopper to adopt mobile shopping. In a different study various constructs were added in TAM and TPB "compatibility, convenient, connectivity, perceived enjoyment, facilitating conditions, perceived risk and trust" to explore the behavioural intention of consumers (Ghazali *et al.*, 2018).

To predict customer behavior in different IT systems, TAM is extended with the construct of TPB by Ajzen in 1985. To study customer's intention, this model is appropriate which studies M-shopping that is closely related to "mobile commerce and payment". In another study Kim and Lee studied "the effect of innovativeness on PEOU but not the direct effect on intention" (Ghazali *et al.*, 2018). Researchers concluded that when technology is "user-friendly, easy to use and free from mental effort, "increase in adoption tendencies. A different study in Vietnam, adoption theory and TAM is used to study the influence of different factors namely "web design, reliability, privacy and customer" on purchase intention (Dang and Pham, 2018).

Ambika *et al.* (2023) included the top theories adopted in 3D technology studies were "flow theory, social presence theory and theory of telepresence" means that 3D evokes more illusionary sense, that provides a better viewpoint on what is displayed in demonstrations and videos for products (Ambika *et al.*, 2023). Other theories like situated cognition, technology adoption model (TAM), stimulus-organism-response (SOR) were widely used in AR research and Flow theory, telepresence theory, stimulus-organism-response (SOR) theory, theory of technological mediation were in VR studies (Ambika *et al.*, 2023).

3. Methodology

This study describes a theoretical review-based work written using the body of existing literature as a basis for the review. Articles from academic journals, research papers, and websites served as the foundation for this study. The existing body of literature aided in comprehending the idea of 3D and exploring the changes that came in online retail because of 3D technology. The current study began with a short overview, highlighted the dearth of previous studies on 3D technology and outlined the objectives of the study. The literature from multiple databases, including Elsevier, Web of Science, Proquest, Scopus, Emerald, Sage, and Google Scholar was searched using keywords associated with 3D technology in online retail.

4. Review of Literature

Idrees *et al.* (2023) done a systematic review on 3D body scanning mobile apps. They stated it as a metaverse technology that can provide many advantages to "fashion retailers and fashion buyers" like "capturing individual body data", "personalize size recommendation", "virtual try on", "sustainability" and "low return rates". So the buyers can get right information regarding size and fit of the apparel. Hence, the customers become more confident while buying fashion product.

Ruusunen *et al.* (2023) had a study on 360 virtual store shopping. They examined that whether 360 virtual stores can fill the gap of need to touch a product. They stated that customers' sense of presence in a 360 virtual store leads to positive attitude towards online shopping and their need to touch the utilitarian items may be compensated.

Kang *et al.* (2020) conducted a study on 3D virtual reality store in online marketing. They included three features namely "interactivity, visual- spatial cues and graphic quality". They found that the interactivity and visual spatial cues increase the enjoyment and perceived information. In comparison to traditional shopping environment, 3D provides more information and enjoyment. When consumers' experience enjoyment, they give preference to visual cues. But their purchase intention is most influenced by the information provided to them (Kang *et al.*, 2020).

Algharabat *et al.* (2017) discussed on the multidimensional construct of 3D-Q and found the effect of 3D-Q on "attitude toward presented product and attitude toward website." Virtual product experience works as a moderator between "attitude toward the presented product, attitude toward website and satisfaction." This study was conducted with the help of a hypothetical website in which 3D laptop is presented and the user could control the form and contents. They stated that 3D-Q is depend on its antecedents and it is a multidimensional construct namely "information quality, system quality, authenticity and enjoyment". They found that authenticity has more influence than other constructs of 3D-Q. System quality is in second place and enjoyment is the third important construct. Information quality came in last place and it is the least important. The effect of 3D on attitude toward website is more than the attitude toward the presented product. They found that attitude toward the presented product and attitude toward the website both have a significant relationship with the user's satisfaction. Virtual product experience moderates the relationship between these three constructs.

Hewawalpita and Perera (2017) focussed on the effect of 3D product presentation on purchase decision, value perception and consumer experience. They made two experiments on mobile and computer screens. In the first experiment they provide normal product view and 360° turnable view with 12 and 24 images of the actual product and in the second experiment horizontal as well as vertical turnable views are provided. They found that the consumer's attitude toward 360° view of 3D products is positive when these are shown on computer screen which leads to pleasure and satisfies the emotional arousal of the customer mind that affects purchase intention. They also found that the perceived value of customers is more when the product is shown in 360° smoother product visualization increase the purchase likelihood. As the mobile users increasing rapidly the main attention should be on them, and try to reduce the loading time to make product visualization smoother.

Wodehouse and Abba (2016) explored different factors that increase interactivity and enjoyment of shopping by using 3D in a shopping catalogue. 3D graphics increase the illusion that creates a sense of presence. Risk perception also reduced by using the 3D product presentation technique. Three major themes of consumer behavior are identified after reviewing the literature; these are "psychology, interface and technology". They describe the interface and identify the three key factors of it namely "interaction, ease of use and experience". They took a sample of 39 participants and framed the "immersive tendency questionnaire (ITQ) and presence questionnaire (PQ)" on a seven-point Likert scale. ITQ is asked to fill out before and PQ after the experiment is done. Pearson correlation uses to

find out related and uncorrelated factors of ITQ and PQ. They find that distraction and information are the major factors of interaction. Hardware helps to reduce distraction and information presented enhance the customer engagement. With the context of realism, some sensory factors like “effective texture, movement and lighting” deliver a better 3d experience. They also find that 3D virtual shopping leads to high stimulus than the 2D product view. Through the literature review, it is also found that “video, colours, music, smell and light” have a favourable effect on the behaviour of the consumer.

Algharabat and Shatnawi (2014) studied the effect of “perceived usefulness, perceived enjoyment and perceived social presence on 3D quality and further the impact of 3D-Q on perceived risk and purchase intention” for apparels. They find that these are good antecedents (PU, PE and PSP) of 3D quality. if 3D is perceived by customers as useful and friendly, then it has a good quality. 3D-Q is also enhanced by product informations which is delivered by 3D presentation like “size and fabric type”. They also find that there is an inverse relationship between “3D and perceived psychological risk”. 3D also facilitates information transmission like “facial expression, posture, dress and non-verbal cues” that stimulate a “sense of human warmth and socialability”.

Choi and Taylor (2014) studied the impact of 3D advertisement in the virtual environment and they examined the effect of “vividness of mental imagery as mediator and product type and need for touch as a moderator.” They took a watch as a geometric product and jacket as a material product for the study. It is found that 3D advertisement has a more significant effect than the 2D advertisement to enhance the “Consumer’s attitude toward the brand, purchase intention and intention to revisit the website”. They also found that the effect of 3D advertising is superior to geometric products than on material products.

Algharabat (2014) studied the impact of “visual control and graphical characteristics on perceive trust”. He took a sample of 140 respondents in his study. He studied that how these two antecedents individually and jointly affect the perceived trust. He found that the perceived trust of customers is enhanced by presenting products with high “visual control and graphical characteristics” and the interaction effect of these two antecedents on perceived trust is significant. They also found that the graphical characteristic has no significant impact on perceived trust if the visual control is low and the effect of visual higher than the visual control.

Raed S. Algharabat and ElSamen (2013) studied the influence of “3D product presentation on trust, attitude and enjoyment” in jewelry industries. Further, they studied the influence of these attributes on purchase intention. A proposed research model is presented in their study with seven variables namely “vividness, interactivity, 3D product presentation, attitude toward the presented products, enjoyment, trust and purchase intention”. They created a hypothetical retail website with 3D product presentation, where the participants can rotate, zoom in or out the product. They took a sample of 380 respondents between the age group of 25-40. They found that “attitude, enjoyment and trust” worked as a mediator between the purchase intention and 3D product presentation. Interactivity and vividness have a favorable relationship with 3D product presentation and product presentation is positively related to “trust, attitude and enjoyment” that further positively affect the purchase intention.

In Shim and Lee (2011) highlighted the impact of product presentation (2D and 3D) on the “perceived risk reduction” of customer on apparel features “silhouette, colour, texture and fit”. He

treated “trust and consumer’s actual body size” as a moderating variable. Experimental research design is used by presenting products in 2D images and 3D virtual models with different body shapes. The main finding of his study is that the perceived risk is reduced by the 3D virtual model more than the 2D images. According to him, the 3D model provides more fit information to customers that leads them to go for the right purchase decision.

Edwards and Gangadharbatla (2001) studied the impact of novelty on positive outcomes, when product is presented by 3D technology in e-commerce. They took a sample of 138 students and provides an exposure to 3D and virtual reality. “Novelty and level of information” were manipulated by 3D product presentation with no information or some product attribute information. “Attitude toward the product, purchase intention, attitude toward website with 3D product and future intention to view 3D products” were the dependent variables. It is found that novelty has no effect on attitude formation but it has a significant effect on purchase intention. The novelty effect is also significant for attitude toward website when 3D presentation is not novel and presented with product information only. Consumers will like to see 3D products in the future also and novelty may not create hurdles for companies. This will benefit both customers and companies.

5. Discussion

This paper is a review article that draws its results from earlier empirical studies. Literature supported that novelty of 3D doesn’t create any hurdle for consumers. Even 3D provides more fit-related information that reduces customers’ perceived risk. Overall the review showed that a few features like 3D quality, interactivity, vividness, controllability, usefulness, lead to favorable outcomes like more perceived enjoyment, trust, elicit more mental imagery, attitude, positive word of mouth, sense of presence, purchase intention, repurchase intention and customers’ satisfaction. Immersive technologies, like 3D effect the consumer behavior more than 2D technology does (Ambika *et al.*, 2023). Vividness and immersion were primarily used as predecessors in 3D research since 3D is associated with improving the object’s image by strengthening the illusory sense (Ambika *et al.*, 2023). According to some researchers, these new technologies like 3D influence mental imagery and effectively communicate product messages.

In a study Algharabat *et al.* (2017) mentioned that the e-tailers should present product in such a manner that customer interacts with these as real one which helps to create a significant relationship with “attitude toward website as well as attitude toward the presented product provides the user with positive evaluation for both the online retailers website and the presented product which use 3D technology”. If the quality of 3D product presentation is good it increases virtual product experiences, interactivity and vividness that enhance the overall experiences of users (Algharabat *et al.*, 2017). Experiences and visual presentation affect the sensory cues of customer’s that leads to “customer satisfaction, brand loyalty, product evaluation, purchase intention and willingness to pay” (Yoganathan *et al.*, 2019).

A study conducted by Algharabat and Shatnawi (2014) revealed that high quality of 3D model creates enjoyment and sense of social presence in customer and help them to find out proper information regarding the product. High quality leads to reduce psychological risk and has significant effect on

purchase intention. There are two types of risk perceived by consumers namely “inherent risk and handled risk”. Inherent risk is product specific and the handled risk is the outcome of a process that is used to reduce inherent risk. The literature reviewed by the researcher is showing that risk is reduced by improving the information required. Risk for apparel products can be reduced by different features like “silhouette, fabric colour, fabric texture and fit”. 3D virtual model provides information to consumers, they can zoom in, rotate it and can change the colour of products (In Shim & Lee, 2011). Both 3D product presentation quality and website quality affect the perception of consumers toward e-shopping (R. Algharabat *et al.*, 2017). 3D images create illusionary direct product experience that shape customer’s perception positively (Choi & Taylor, 2014). 3D virtual catalogue would be helpful for both customers and users alike (Wodehouse & Abba, 2016). 3D presentation benefits both advertiser and consumers and provide a “unique form of information” to customers to make a wise purchase decision (Edwards & Gangadharbatla, 2001). Ease of use, interactivity and realism influence consumer behaviour (Wodehouse & Abba, 2016).

Now a day, metaverse related technologies are used in libraries, 3D is one of them. In US libraries mostly 3D technology in the form of printing and model building is used (Guo *et al.*, 2023). Along with AR and VR, 3D is used in tourism and hospitality and game industries. 3D and computer-generated imagery (CGI) are frequently utilized in ads, particularly in the cosmetics sector and this trend is expected to keep evolving in the upcoming year. Online retailers are combining 3D technology along with other metaverse technologies (AR and VR) to induce more interactive virtual product experience. Researchers may anticipate increasingly demanding and engaging buying experiences that conflate the real and electronic realms as Metaverse develops. The Metaverse will certainly have a significant impact on how retail grows in coming years, even though the full extent of its implications in retailing remains to be investigated. The metaverse connects the physical and digital worlds and has the power to transform established standards of management in numerous of disciplines and sectors (Mohanty *et al.*, 2022).

6. Conclusion

The role of 3D technology in e-tailing is irrefutable. The digital retail sector is changing because of 3D technology. E-tailers are attempting to reduce the discrepancy between a good’s actual looks and its virtual representation. Developments in technology, like 3D imagery, has made this task easier. Different theories associated with technologies help to measure the factors that lure customers towards it. 3D has an immense effect on customer attitudes and buying behavior because of its ability to improve product display, interactivity, and vividness and to reduce customers’ perceived risk. Online retailers who make this cutting-edge technological investment are likely to experience faster business growth and a competitive advantage over their rivals. Retailers must adapt to the rapid changes in technology and take advantage of the benefits that 3D technology offers. In addition to producing innovative designs, the use of 3D technology also has concern towards sustainability. The current research outcomes were based on secondary data (only literature review). Researchers may conduct empirical study by adopting different theories along with different product categories to validate the current research outcome.

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Loyalty of Individual Investors towards Marketable Financial Products: A Structural Logic of Customer-engagement, Mental Accounting, & Attitude

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G11, G40, G41, M31

Abstract: In today's digital market, customer-engagement (CE) on numerous platforms is vital for marketing success. This gives a reason to examine the structural relationship between CE, mental accounting, investor attitude, and loyalty for marketable financial products. This study uses a qualitative research design (ISM- Interpretive Structural Modeling) to emphasise structural links that can lead to investor loyalty. CE drives structural aspects. Mental accounting and investor attitude influence investor loyalty. This study solely analyses marketable financial products including mutual funds, SIPs, and certain insurance products. This study lacks empirical evidence. This study examined how mental accounting affects investor participation, sentiments, and loyalty. This knowledge will help design financial product marketing strategies because financial products have varying worth based on context, even though they have similar qualities. The study proposes a model on the structural relationship between CE, mental accounting, investors' attitude, and loyalty, which would disclose a new academic perspective along the strategic ramifications for the financial markets.

1. Introduction

Even with an optimum level of financial literacy, managing a portfolio of financial products may be challenging for an individual investor, because a normal individual investor in Indian scenario is embarked upon significant level of risk, which raises many questions in its thoughts both before and after investing. In the context of financial product marketing, where CE can play a crucial role in minimising a lot of these doubts while presenting financial products with moderate risk because information

about products can be gained through engagement, uncertain investors often switch between different investing options, making investors' loyalty a vital prospect. Poor customer service costs U.S. businesses a total of \$1.6 trillion annually (Hyken, 2018), and Forbes reports that customers most frequently switch brands when they feel undervalued (Morgan, 2019). Customers get information from a range of offline and online sources to determine which products to favour. Three main concepts—consumer participation, involvement, and commitment—define CE, with involvement being the most important for CE (Vinerean and Opreana, 2021). A satisfied customer is more likely to continue using a superior product.

Attitude can be formed by both inner values and beliefs and by external stimuli. Rightly, Singh (2011) in a study found that potential and liquidity are viewed as the most enticing aspects, followed by flexibility and transparency. Because customers' attitude influences their final decision that can lead to switching-decision of investments, this study attempts to explore the relationships in a new situation. This study also includes mental accounting, which customers employ to obtain the advantages and expenses associated with those services. Decisions to purchase goods and services are made based on the overall potential. Purchases are undertaken if the benefits outweigh the costs. Thaler (1985) proposed a mental accounting theory based on prospect theory. Prospect theory is extended by mental accounting theory by integrating compound outcomes, whereas prospect theory's value function is defined solely over a single unidimensional result. Although mental accounting theory was developed in the context of consumer spending, it can be applied to other types of decisions as well which includes investing (Soman, 2001).

2. Literature Review

2.1. Antecedents of Customer Engagement (CE)

Customer engagement (CE) may be characterised by three primary constructs: consumers' participation, involvement, and commitment where 'Involvement' holds highest magnitude (Vinerean and Opreana, 2021). Technological, psychological, and cultural aspects precede CE in chronological order, whereas re-purchase behaviour is an outcome though, cultural elements can be more significant in turning CE into commercial success (Girija and Sharma, 2020). CE affects brand performance outcomes including brand loyalty and CE habits, such as customers' tendency to invest time and energy in asset management, financial planning, and communication (Turtiainen, 2021). Apart from purchasing, CE constitutes a lot of behavioural non-transactional activities which include word-of-mouth, value co-creation, referrals, review, rating, C2C (customer to customer) contacts, and recommendation. CE is psychologically motivated by advocacy, loyalty, dedication, co-creation, problem-solving, decision-making, and familiarity (Busalim *et al.*, 2019). CE determined as (customer purchase, referrals, influence, & knowledge) positively influenced by needs satisfaction that are self-determined namely (autonomy, relatedness, & competence). Shareholders' opinions and behaviour towards the company differ depending on whether they sell a stock for a profit or a loss. Losses cause unpleasant emotions, which lower behavioural loyalty and pleasure; on the other hand profit generates more positive emotions, which ultimately build the preference towards a particular financial product over its rivals (Hoffmann and Ketteler, 2015). At the corporate

level, this is demonstrated by the continuous use of satisfaction parameters by businesses to evaluate consumer reactions to their goods and services in the hope that higher levels of satisfaction will result in greater client loyalty, purchase intention, word-of-mouth referrals, profitability, market share, and return on investment (Allen & Willburn, 2002; Reichheld & Detrick, 2003; Heskett et al., 1994; Anderson and Mittal, 2000; Keiningham & Vavra, 2001; Oyewole, 2002; Mittal & Kamakura, 2001). With the development of two-way contact between customers and brands through internet platforms, CE increases remarkably; accordingly loyalty of concerned customers (individual investors) enhances to the respective brands and they feel more committed, empowered, connected and emotionally bonded (Brodie *et al.*, 2013). Positive CE results from a positive acquisition experience. There is a significant recency effect, which states that the most recent interaction of the service encounter has the biggest impact on CE, and customers perceive each component of the service interaction to have a distinct impact rather than a compounded one (Harman and Porter, 2021). Social media marketing has a key effect on how consumers interact with a brand. Furthermore, consumer brand engagement was identified as a crucial mediator between social media marketing and brand awareness. The social media marketing activities of micro-learning platforms aid in building consumer brand engagement and brand recognition for these organisations. Hence, similar steps by financial institutions can be considered fruitful in conversion of potential customers into investing. Social media marketing is best at increasing brand awareness through customer brand contact (Mujica-Luna *et al.*, 2021).

2.2. Relationship between ‘Customer-Engagement’ and ‘Loyalty’

To be the market leader, 24/7 connection with the audience is a key strategic element. A study shows that 19% increase in site visits per year and an increase in order volume. Annually, frequency grows by 7%, and active client rate climbs by 19%, among other things (Ziginov, 2021). Hence while securing loyalty through online platforms, it is important for a marketer to measure the impact of CE used as a strategy in the marketing of financial products. Brand recognition and loyalty are found to be strongly and positively associated to mobile app engagement. Further, the impacts of perceived utility, perceived price advantage, and user interface on brand recognition and loyalty were mediated by mobile app-engagement (Tian *et al.*, 2021). Customers talking highly about a brand, expressing their experiences, recommending, referring others or advocating about the brand is a sign of loyalty generation through CE. CE and relationship programme receptivity are positively improved by omni-channel integration quality, which in turn impacts customer loyalty. In addition, consumer influence has a favourable impact on customer loyalty. The relationship programme receptiveness is proven by involvement (Gao and Huang, 2021). In the context of service environment CE is influenced both directly and indirectly by the service environment, whereas loyalty traits are only moderated by brand equity (Ou et al., 2020). The impact of CE on brand loyalty is mediated by both brand attachment and consumer trust. The association between CE and brand attachment brand loyalty is closer than the relationship between CE and customer trust brand loyalty (Li *et al.*, 2020). CE is measured in the context of business loyalty programs for credit card users by behaviours such as looking for information, redeeming points, being responsive to information, adjusting buying behaviour, sharing information, and proactively utilizing cards in a chronological order (Bruneau et al., 2018). According to Vinish *et al.* (2022) situational

factors that cause emotional distress influence shop loyalty intentions, while in line of the retail checkout and in case of portfolio return and volatility, it can be predicted using attitude (Rohilla and Tripathi, 2022). Thus, inference can be drawn that desired customer-engagement can lead to loyalty of individual investors in the context of marketable financial products.

2.3. Path of ‘Customer-Engagement’ to ‘Loyalty’ through ‘Mental Accounting’

Decision making has been a tedious task since decades. The factors influencing decisions are many but as per our study the focus is on CE and mental accounting. The potential of CE to build relationships with customers outside of monetary transactions has been identified in study by Venkatesan (2017) which highlights an important value of CE. The relationship creates a psychological impact in the minds of the customer while making decision which somewhere has an effect on the purchase intention. However a study shows that given greater linked levels of perceived incentive value, a discount is more successful in increasing customers’ purchase intentions (Qiu *et al.*, 2022). A study clearly mentions that participation by customers in a business’s offerings significantly affects their loyalty to that business and their propensity to consider alternatives (Rabbanee, 2019).

Mental accounting theory says that people prefer to construct mental budgets for various categories of consumption as reference points and then check their consumption against the set budgets to monitor their expenditure (Thaler, 1985, 1990). When individual investors think for investing or spending money, they do calculate the risk and return from such investments; and mental accounting theory was created in the context of consumer spending. So, it can also be applied to other sorts of decisions, such as time management decisions (Soman, 2001). Thus, the present study is intended to test the connection of mental accounting with loyalty decision of financial customers (individual investors) as optimal combination of debt and equity enhances return on equity, liquidity, and profitability (Rifana and Geetha, 2022). Therefore, it can be said that mental accounting does affect the investors’ investment decisions, which has influence of CE and mental accounting. This can be substantiated by study of Peetz and Howard (2020) that mental accounting may be used in cognition much beyond financial decision making. Hence, loyalty towards marketable financial products can be correlated to mental accounting.

2.4. Path of ‘Customer-Engagement’ to ‘Loyalty’ through ‘Attitude’

The behaviour of investors depicts their attitude towards investment in financial products. The attitude measures based on perceptions of and priorities for various product characteristics that may be connected to brand choice (Bass and Talarzyk, 1972), financial literacy (Kaur and Singh, 2021), financial behaviour (Rai *et al.*, 2019), future loyalty and favorable pricing judgments (Bergel *et al.*, 2019). When attitude is related to financial decision making it somewhere also influences the intentions. This can be cited by the study of Yoopetch and Chaithanapat (2021), that financial attitude and behaviour have a substantial impact on investment intention. According to Aren and Hamamci (2020) the investors having investment intention towards risky assets can be differentiated from the investors who do not have the investment intention towards the risky assets based on openness (a personality trait) and sadness (a dimension of emotion). Further, they found that the risk aversion and both personality traits (neuroticism & openness)

are interacting with investment intension. On the other hand, CE is not a phase that an individual undergoes only during purchase decisions but also during and after the decision has been made. When it comes to finances, CE heavily relies on the engagement of customers and service providers (Auh *et al.*, 2007). This also indicates that attitude of investor plays a role in he mentioned positive results as the study shows that engaged consumers exhibit a more favorable emotional attitude (Bergel *et al.*, 2019). Hence it could be concluded that CE leads along with financial attitude results in switching decisions in terms of positive attitude which shows that loyalty towards a brand will retain engaged customers (Banyte and Dovaliene, 2014) and establishing enduring ties with consumers is crucial for ensuring satisfaction and fostering loyalty (Rifana and Geetha, 2022), which provides a logical linkage of ‘attitude’ of individual investors within the relationship of their loyalty and CE.

3. Research Problem

“Whether loyalty of financial customer is a sequential consequence of customer-engagement, attitude, and mental accounting of concerned customers”?

3.1. Objectives of the Study

Based on the research problem, objectives of this study are decided as follows.

- To identify the important antecedents of effective customer-engagement for the transactions of financial products.
- To study the relationship between ‘customer-engagement’ and decision making of financial customers (individual investors).
- To study the role of ‘attitude’ and ‘mental accounting’ within the relationship between customer-engagement and decision making of financial customers.
- To propose some important strategies for the marketing of relevant financial products in the Indian scenario.

4. Research Design and Methodology

The research design is the roadmap for the whole study. Thus, this research examines the data’s sources, analytical mechanism, and implementation method. The qualitative research was based on industry experts’ data and a few basic studies/surveys. The study’s problem statement was described using qualitative data from in-depth literature reviews and expert opinions. The problem statement and literature reasoning guide the study objectives. According to the qualitative study approach, the authors used ISM (Interpretive Structural Modelling) to construct a conceptual model containing financial customer strategy features. In the context of financial product marketing, individual investors’ attitude and mental accounting are logically tied to the strategic component of marketing operations, customer-engagement, to achieve “favourable decision making” by the financial customers.

5. Results and Discussion

The research explains the methodical ISM technique that was followed.

Step 1: To determine which variables or aspects are important through research and consultation with experts.

Step 2: In this step, pair-wise comparisons are made based on the context relationship among the discovered variables/factors.

Step 3: Construct a self-interaction matrix (SSIM) to display the interdependencies between the variables and other constituents. Each connection is carefully considered on its own merits.

Step 4: Change the values of the self-interaction matrix (SSIM) from 0 to 1* to make it a reachability matrix.

Step 5: The final reach-ability matrix is obtained in by verifying the transitivity of the initial reach-ability matrix. The transitivity rule of thumb is applied.

Step 6: Using the final reach-ability matrix as a guide, variables are iteratively divided into levels.

Step 7: Conical matrix is created by grouping the variables/factors according to their dependency power, driving power, and levels.

Step 8: Construct the digraph using the complete reach-ability matrix.

Step 9: An ISM model is constructed using digraph logic.

Step 10: MICMAC analysis is used to provide an application-focused interpretation.

5.1. ISM (Interpretive Structural Modelling)

ISM is a group effort, where a collection of loosely connected components can take the form of a meaningful coherent whole. Any complex applications with multiple factors can be more accurately depicted by considering the direct and indirect connections between the elements. Insights into coherent interpretations of these linkages are thus gained through ISM (Attri *et al.*, 2013), because ISM helps individuals or groups build an in-depth understanding of the interdependencies between a wide variety of factors, where complex issues can be better understood and a plan of action for resolving them can be developed (Warfield, 1973).

5.1.1. Structural Self-interaction Matrix

To build the contextual relationship among the variables, elements with 'leads to' or 'influences' type relationship from the items' context are identified. Considering the contextual relationship of each element and the presence of a relationship between any two elements I and j, we evaluate the directions of links that are under consideration.

Two elements, I, and j, are related in the following four ways, shown by the corresponding symbols:

- (a) The 'V' for the correlation between I and j (i.e., factor I will influence factor j)
- (b) 'A' for how j relates to I as a factor (i.e., factor I will be influenced by factor j)
- (c) Relationships in both directions are denoted by 'X' (factors I & j have effect on one another)
- (d) If 'O' appears, it means the parts are unrelated (i.e., barriers I & j are unrelated).

The following SSIM matrix is constructed based on these contextual links.

Table 1: Structural Self-interaction Matrix

<i>Dimensions</i>	<i>OCE</i>	<i>PCE</i>	<i>MA</i>	<i>AT</i>	<i>LT</i>
OCE	X	V	O	V	V
PCE	A	X	V	V	V
MA	O	A	X	V	O
AT	A	A	A	X	V
LT	A	A	O	A	X

Source: Authors' Own Compilation

5.1.2. Initial Reachability Matrix

Having established SSIM, the next step in the ISM method is to generate an initial reachability matrix. The initial reachability matrix is obtained by substituting 1s and 0s for the four symbols of SSIM. The guidelines for this change are as follows.

- (a) If SSIM I j) is V, then I j) in the reachability matrix is 1, and (j, I) is 0.
To clarify (b), if the value in SSIM I j) is A, the value in the corresponding cell of the matrix will change to 0 and the value in cell (j, I will increase by 1).
- (c) Both the (j, I) and the I j) entries in the matrix become 1 if the SSIM item I j) is X.
- (d) Both the (j, I) and the I j) entries in the matrix become 0 if the corresponding I j) element in the SSIM is O.

The table 2 displays an initial reachability matrix that was constructed using the above guidelines.

Table 2: Initial Reachability Matrix

<i>Dimensions</i>	<i>OCE</i>	<i>PCE</i>	<i>MA</i>	<i>AT</i>	<i>LT</i>
OCE	1	1	0	1	1
PCE	0	1	1	1	1
MA	0	0	1	1	0
AT	0	0	0	1	1
LT	0	0	0	0	1

Source: Authors' Own Compilation

5.1.3. Final Reachability Matrix

Along the initial reachability matrix, the transitivity is checked and 1* entries are provided to integrate the transitivity. After verifying transitivity, the resulting reachability matrix is displayed in the table 3.

Table 3: Final Reachability Matrix

<i>Dimensions</i>	<i>OCE</i>	<i>PCE</i>	<i>MA</i>	<i>AT</i>	<i>LT</i>	<i>Driving Power</i>
OCE	1	1	1*	1	1	5
PCE	1*	1	1	1	1	5
MA	0	0	1	1	1*	3
AT	0	0	0	1	1	2
LT	0	0	0	0	1	1
Dependency Power	2	2	3	4	5	

Source: Authors' Own Compilation

5.1.4. Level Partitioning

The final reachability matrix determines each factor's antecedents and reachable. The factor's reachability set, and antecedent set are the factors it can affect or get affected. The intersection of these sets for each factor determines its levels. The highest-ranking ISM components share reachability and intersection sets. Top-level influences cannot force lower-level ones down. Finding the highest-level component eliminates it. Find the next level's items. This process is repeated until all element concentrations are calculated.

Table 4: Iteration 1

<i>Dimensions</i>	<i>Reachability set</i>	<i>Antecedents set</i>	<i>Intersections set</i>	<i>Level</i>
OCE	1,2,3,4,5	1,2	1,2	
PCE	1,2,3,4,5	1,2	1,2	
MA	3,4,5	1,2,3	3	
AT	4,5	1,2,3,4	4	
LT	5	1,2,3,4,5	5	I

Source: Authors' Own Compilation

In the first iteration of the ISM model, 'loyalty' is at the top because it is considered the first level.

Table 5: Iteration 2

<i>Dimensions</i>	<i>Reachability set</i>	<i>Antecedents set</i>	<i>Intersections set</i>	<i>Level</i>
OCE	1,2,3,4	1,2	1,2	
PCE	1,2,3,4	1,2	1,2	
MA	3,4	1,2,3	3	
AT	4	1,2,3,4	4	II

Source: Authors' Own Compilation

Attitude occupies level II, one spot below "loyalty," which is located at level I.

Table 6: Iteration 3

<i>Dimensions</i>	<i>Reachability set</i>	<i>Antecedents set</i>	<i>Intersections set</i>	<i>Level</i>
OCE	1,2,3	1,2	1,2	
PCE	1,2,3	1,2	1,2	
MA	3	1,2,3	3	III

Source: Authors' Own Compilation

The third iteration reveals the third level, in which “mental accounting,” has been identified.

Table 7: Iteration 4

<i>Dimensions</i>	<i>Reachability set</i>	<i>Antecedents set</i>	<i>Intersections set</i>	<i>Level</i>
OCE	1,2	1,2	1,2	IV
PCE	1,2	1,2	1,2	

Source: Authors' Own Compilation

The fourth and final iteration shows “Physical CE” and “Online CE” in Level IV.

5.1.5. Conical Matrix

The final reachability matrix is transformed into a conical shape by clustering together components of the same level across rows and columns. One can determine the weight of a factor as a driver by adding the ones in its rows, and the weight of a factor as a dependent by adding the ones in its columns.

Table 8: Conical Matrix

<i>Dimensions</i>	<i>5</i>	<i>4</i>	<i>3</i>	<i>2</i>	<i>1</i>
5	1				
4	1	1			
3	1	1	1		
2	1	1	1	1	1
1	1	1	1	1	1

Source: Authors' Own Compilation

5.1.6. Digraph

The digraph (figure 1) is constructed from the contextual relationship and the subsequent direct connectivity and transitivity reflected in the final reachability matrix. The structure consists of nodes

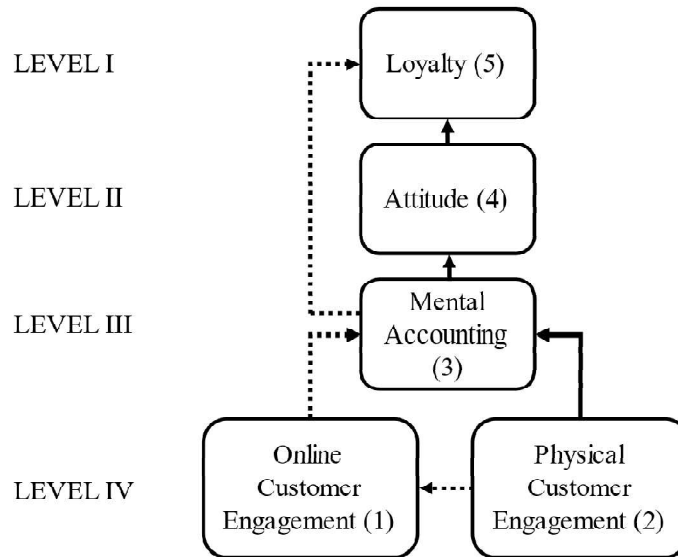


Figure 1: ISM model (diagraph)

Source: Authors' Own Compilation

↑ Driving Power ↑	5				OCE,PCE							
	4.5											
	4	Independent Barrier						Linkage Barrier				
	3.5											
	3						MA					
	2.5											
	2								AT			
	1.5	Autonomous Barrier						Dependent Barrier				
	1											LT
	0.5											
	0	0.5	1	1.5		2	2.5	3	3.5	4	4.5	5
	→ Dependency Power →											

Figure 2: MICMAC Analysis

Source: Authors' Own Compilation

and a network of edges. In the digraph, solid arrows represent direct connections while dotted arrows represent indirect ones.

6. MICMAC Analysis

Based on their relative driving and dependency strength, the MICMAC analysis groups all the elements into four distinct categories: autonomous barrier, independent barrier, linkage barrier, and dependent barrier. The first group is an unconnected autonomous barrier with low driving and reliance power. Since no relevant elements fit into this cluster, it is empty. The second set consists of ‘independent barriers’, which make up a cluster with high driving power but low dependency power. In this grouping, we find physical CE and online consumer engagement. Third, there’s the very influential and dependent linkage cluster. A system-wide impact can be expected from any shift in this class. Mental accounting is in this class. The weak-driving but strong-dependency-power i.e., dependent barrier constitutes the fourth cluster. This group includes attitude and loyalty.

7. Conclusion and Contributions

CE affects investor loyalty (combined effects of online & in-person CE). Brands must engage both types of customers to make them feel connected. The above outcome of the present study is rarely studied by any researchers, especially related to the financial products. Customers do mental calculations while interacting with brands/products, which influences their final decision. Mental accounting makes it easier to analyse brands’ pros and cons and value one brand’s bargain more than its competitors. Accelerated CE boosts financial clients’ positivity and loyalty. Thus, loyalty’s structural interaction with mental accounting, financial customers’ attitudes, and customer-engagement affects the customer’s decision of investment (subscription of financial product), especially for moderately risky financial products that are comparable. No other study has examined this usual structural link. As brands compete with similar items with same risk and return, people trust a brand’s service-scape over others.

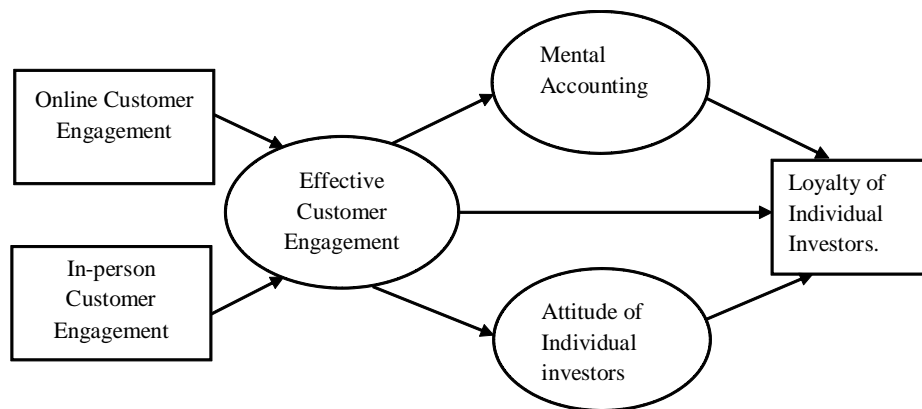


Figure 3: Loyalty- A consequence of customer-engagement

Source: Authors’ Own Compilation

7.1. Limitations & De-limitations

The model of this study is primarily the output of a qualitative technique (ISM) that based on the literature and expert opinion; however empirical evidence may give rise to new industrial implications. This research presents a convincing framework for new financial products, but future researchers can cover other financial products and different services. Thus, future researchers can use the following conceptual model (figure 3) for empirical testing with psychometric feature estimation.

Finally, since several studies have found a strong correlation between CE and 'loyalty', successful implementation of CE may have a positive impact on 'loyalty' (Gao & Huang, 2021; Buoye et al., 2022; Bruneau et al., 2018; Hoffmann & Ketteler, 2015) through investors' mental accounting and attitude (figure 3), which can act as path finder for the future similar researchers.

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Assessing the Sustainability of Self-Help Groups in India: An Interstate Analysis

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Panel regression method

JEL Classification

G21, O53, C10

Abstract: Self Help Groups (SHGs) have aspired to resolve the vexing issue of financial diversity by augmenting self-reliance amongst the unemployed and poverty-stricken masses of developing and underdeveloped nations. However, the sustainability of SHGs is essential since many SHGs cannot manage to function in the long term. Therefore, the main aim of the present study is to assess the sustainability of SHGs in the context of financial inclusion across Indian states using panel regression. Findings demonstrate that the number of SHGs has risen due to the increased credit disbursement along with the accessibility to various financial services. Additionally, it is unusual to find that the training given to SHG leaders/members does not have an impact on the sustainability of SHGs. Implications through this study highlight a need to increase financial inclusion, and technical literacy amongst the SHGs to sustain and scale their ventures in the global world.

1. Introduction

Financial Inclusion is one of the major concerns of the Indian economy and the policymakers as India suffers a big disparity of income among its masses. In India, 22 % of the population or 270 million people lives below the poverty line (World Bank, 2016). Since financial inclusion facilitates the empowerment of underprivileged masses and endows them with correct financial decisions (Natrajan and Sulaiman 2021), it is high time to realize the importance of making these underprivileged masses financially independent by becoming self-reliant and realizing their own potential to produce and earn. The main pursuit of Self-Help Groups (SHGs) is to provide microfinance and micro-enterprise development for these unprivileged people in urban and rural areas. SHGs help the masses to think and evolve in order to adapt and take advantage of the changed global economic scenario. This has resulted in reducing financial diversity prevalent in the country but more than that it has provided

economic and financial security and stability to the masses living below the poverty line specifically in rural areas. It mainly focuses on providing microfinance assistance through various schemes and increasing the banking network. Microfinance has been tipped as a powerful tool to promote inclusive economic growth by financing and fostering development and bringing about positive socio-economic changes (Batra, 2018; Nayak *et al.*, 2023).

SHGs are of vital importance for numerous reasons but the most important being their ability to penetrate at the deepest levels amongst the masses in the rural areas. Its guarded and vigilant approach towards the credit requirements of these illiterate and poor masses, enabled them to win their trust, unlike big financial institutions. SHGs provide collateral-free credit assistance with low returns. Hence it is apt to say that SHG microfinance initiatives are effervescent for the poor and specifically for the rural population of India. Focus on the welfare, well-being, and financial upliftment of females has also been one of the major objectives and functions of the SHGs. It acts as an intermediary between various government and non-government agencies and is not limited to financial inclusion but also equally effective for socio-economic issues like women empowerment, literacy, alleviation of poverty, effective application of governmental schemes, healthcare, etc.

However, there exist regional disparities in credit availability to SHGs and also a widening gap between loans disbursed to SHGs and savings of SHGs. As indicated by Sinha and Navin (2021), the funding requirements of SHGs are far greater than their accumulated savings along with severe regional variations. This draws attention to an important question of the sustainability of SHGs, which has seldom been studied in the extant literature. The sustainability of SHGs is essential since many SHGs cannot manage to function in the long term. Also, as pointed out by Kasi (2022), it is seen that SHGs do face challenges in the sustainability of the programs due to a lack of community participation, financial dependence, and social inequality. Further, Karmakar (2008) in his study raised a few concerns regarding the sustainability of SHGs and the culmination of SHGs from micro-units to micro-enterprises.

Hitherto, to best of the knowledge, the sustainability of SHGs at the state level has not been undertaken. Given the above setting, the intent of the study is twofold: firstly, to examine the regional trends in the number of SHGs in India. Second, to analyse the sustainability of SHGs in the context of financial inclusion across Indian states.

The present study is structured as: Section 2 presents an overview of SHGs and trends in the number of SHGs; Section 3 summarizes different strands of literature; Section 4 outlines the methodology of panel regression; Section 5 deliberates econometric results and Section 6 emphasizes conclusion and policy implications.

2. Self-Help Groups in India

According to the National Bank for Agricultural and Rural Development (NABARD), the SHG is regarded as one of the most impactful and accepted models amongst the underprivileged masses of the country. SHGs have aimed to increase financial inclusion by adopting significant approaches to financial intermediation. Further, they aim at availing cheap financial services to the marginalized masses with a process of self-management and development of SHG members. SHGs are clusters

formulated with the intention of providing economic and social upliftment and assistance to the poor people residing in rural areas. The main goal of SHGs is to provide help on the economic and social front to the underprivileged section of the country. SHGs avail the dual benefit of access to low-cost financial services as well as an opportunity for self-development for the joining members.

In India, NABARD, in consultation with the Reserve Bank of India (RBI), Commercial Banks and Non-Governmental Organizations (NGOs), launched a pilot project in 1991–92 for linking of SHGs with banks. Thus, the microfinance activity is the result of NABARD’S work that started in February 1992 through an initial pilot project promoting 500 SHGs. In 1992, NABARD’S SHGs Bank linkage project (SHG-BLP) outreached to the extent that it became the world’s largest microfinance initiative. RBI had advised Commercial Banks in July 1991 to extend finance to SHGs as per NABARD guidelines. Subsequently, the linkage project was extended to RRBs and Cooperatives. It is observed that since 2000, the number of SHGs are increasing faster (figure 1). According to the Economic Survey 2022-23, the number of SHG-BLP in the last decade grew at a rate of 10.8 percent annually, whereas, the credit disbursement per SHG has increased at a rate of 5.7 percent during the same period.

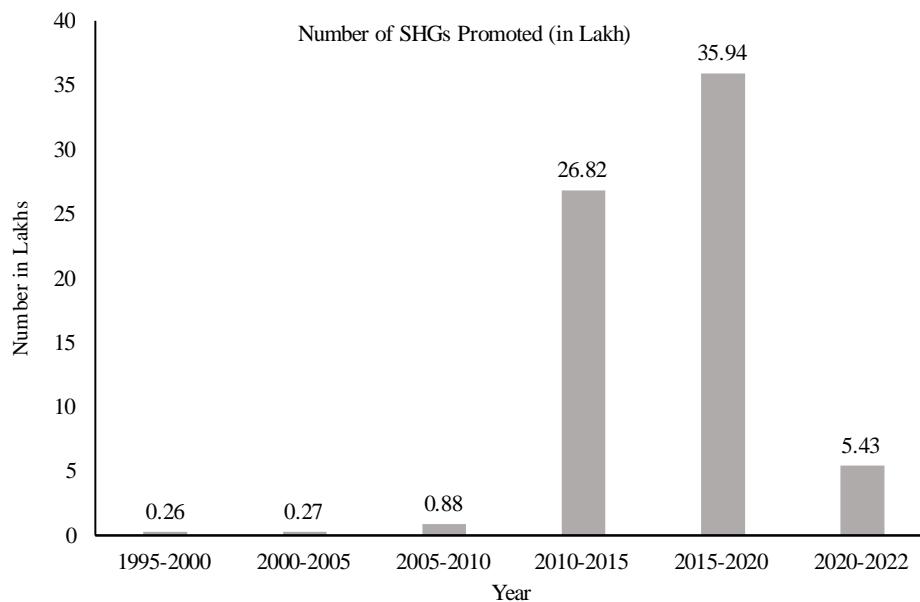


Figure 1: Trends in Number of SHGs in India

Source: Ministry of Rural Development, Government of India

The efforts of SHGs are guided towards promoting village, cottage, and small-scale industries largely to generate and enhance their production capacity by providing them microfinance assistance, educating them about new technology, new avenues, and new platforms where they can access big markets for their product. These loans are collateral-free and are extended with the sole purpose of generating the functional capacity of the poor people living in rural areas. This endeavor not only aims

at financial inclusion on a large scale but also empowers the poor masses with higher incomes, higher standards of living, better education, empowering the weaker section of the society, and alleviation of poverty.

The Government of India provides stimulus to the SHGs on a continuous basis by facilitating SHG federation like Village Organisations (VO) and Cluster Level Federations (CLFs) which provides basic assistance. Credit facilitation being a primary intent of SHGs, they have been provided Community Investment Support Fund (CISF) and Revolving Fund (RF) to help them attain more credits from banks. In order to upskill, the members of SHG are regularly provided with different trainings for SHG management, introducing new technologies related to livelihood and financial literacy. According to the Ministry of Rural Development, an RF of 10,000-15000 per SHG, is provided by the National Rural Livelihood Mission (NRLM). Also, a fund of Rs. 2,50,000 has been provided per SHG by the CISF. These funds assist the members in attaining socio-economic activities according to their micro-credit investment plans, and the funds stay perpetually with the SHGs and their federations (Ministry of Rural Development, 2022).

3. Literature Review

The extant literature on SHGs comprises different facets of the growth of SHGs. Few studies assessed the general impact of SHG-BLP, whereas other studies concentrated on the impact of SHGs and women's empowerment. Yet another group of researchers analyzed the importance of microfinance and SHGs in overcoming the problem of financial diversity.

Sustainability can be attained as long as enterprises are owned and managed by the owners. The owners are trained and work with the endeavour to scale up the businesses and are aware of the requisites for the same. They will need to learn the importance of new technology, establish partnerships, understand global conditions and market requirements, become versatile with the range of products and services available, and explore new markets. Attaining scalability will ensure sustainability in the long run for the owners. Therefore, the SHGs train and work in accordance with the owners of these micro units, catering to the larger perspectives and demands for scaling their business in the future. SHGs are observed as a provider of strong sustainable initiatives in the places where local self-government and the local community are proactive in participating specifically for the marginalized rural people.

However, in the study conducted by Ghosh *et al.* (2023), the factors affecting the sustainability of SHGs were studied in natural disaster-affected communities and it was concluded that the SHGs, government, and the policymakers must focus on creating ease in attaining financing, building faith in the masses in the system and a better management of SHGs is needed to make the programs more effective and finally attain the objective in real terms.

Aggarwal *et al.* (2021) in their study highlighted the potential advantages SHGs have in empowering, encouraging, and motivating poor women in rural areas such that they were able to transcend the social barriers that impacted their freedom and liberty. With the measures taken by the SHGs over the years, it is observed that women have become more independent financially and hence stronger socially, yet there is further scope. Joshi (2019) did an analysis of women's self-help groups' involvement in microfinance programs in India and found that besides other factors age, family type, education, and

distance from the market have a major impact on the participation of women in SHGs. Needless to say, women's empowerment is significantly more after the introduction of SHGs.

In relevance to the above, Verma *et al.* (2023) studied the impact of Self-Help groups on women empowerment in India and found out that SHGs profoundly impact the empowerment of women financially, politically, and socially. The study inferred that a lot has developed for women in all spheres, still, a lot remains to be addressed, monitored and major attention is required to make them technically literate, financially mindful, and aware of their social status and health. Nicholas (2021) in his study indicated, that SHGs have performed effectively by providing an equitable platform for availing livelihood and creating social and health awareness for the benefit of the deprived masses. SHGs function as a tribune towards creating health awareness which to a great extent depends on the participation, and attendance norms of SHGs and related to socio-economic conditions and social capital. Social capital holds great importance for SHGs and the organizations implementing it.

The importance of microfinance assistance in modern times, through SHGs has been acclaimed internationally specifically in knocking off the challenges presented by unemployment and poverty with a special relevance to the women. It is well understood by all that way to the economic development of a nation is possible only by reducing poverty, giving financial independence, and eradicating unemployment. (Lavoori and Paramanik, 2014). "Microfinance programs need to examine their inclusion and retention strategies in favour of the poorest household using multidimensional indicators that can capture poverty in its myriad forms" (Ahmad, 2020). The initiatives taken by SHGs to avail microfinance to the unbanked women of rural areas have brought them under the wings of the Self-Help Group-Bank Linkage Programme (SHG-BLP) and made credit accessible for them. In addition to this, these initiatives also helped in reducing the gender gap in accessing financial and banking services for women (Khemnar, 2019).

For a developing country like India which is predominantly agricultural, where a large part of the population lives in rural areas, financial inclusion acts as a catalyst to transform rural India (Sibi and Ananth 2017). Although continuous efforts are made by SHGs for the financial inclusion of the rural masses, it is one of the imperative aspects that needs to be evaluated (Kumar and Golait, 2009). The COVID-19 pandemic has been an eye opener as post-pandemic the issue of self-reliance has become a dire need for the masses, especially in rural areas. In one of the studies, it was revealed that social and personal deprivation and lack of accessibility contribute to financial exclusion and should be viewed as key barriers to financial inclusion (Cnaan, 2012). Another study by Bammi (2014) mentioned that the bank linkage program seems to provide various positive impacts on the lives of the rural section in the form of additional savings, and improved status in households and communities. The point worth mentioning here is that in a developing country like India, it is more relevant to overcome infrastructural challenges in order to attain inclusive economic growth. Also, knowledge and more focus on the existing financial processes and means is of great importance. This can be achieved by increased financial literacy and financial counselling. Different financial institutions need to mobilize resources and divert them towards the vulnerable section of society. It is necessary to develop a strong information and communication technology base in urban and rural areas to promote inclusive economic structure and growth in the future (Mukherjee *et al.*, 2019).

4. Research Methodology

As indicated by Bammi (2014), it is imperative to evaluate the sustainability of SHGs while examining the effect of SHG-BPL. As suggested by Dave and Seibel (2002), savings is the most important sustainability measurement indicator for SHGs since financial resources raised through savings and retained earnings are central to self-reliance and sustainability. Further as pointed out by Bhatia (2007), among the issues in the sustainability of SHGs is the easy access to bank loans or bank credit to SHGs. Over a period of time, SHGs are expected to avail and consume a high amount of credit in order to attain scalability. Additionally, as proposed by Parida and Sinha (2010), loan repayment is an important element of the sustainability of SHGs.

4.1. Data

In order to examine and understand the sustainability of SHGs in the context of their financial inclusion, the present study investigates the annual data of 27 states for the period from 2015-16 to 2021-22 for empirical analysis. Table 1 represents an overview of variables utilised along with their detailed explanation and source. All variables are transformed by their logarithm.

Table 1: Variables and Sources

<i>Variables</i>	<i>Description</i>	<i>Sources</i>
Total Self-Help Groups (SHGs)	Total number of SHGs bank-linked savings (Commercial and RRBs)	NABARD - Status of Microfinance in India of various years
Loans disbursed (LD)	Loans disbursed to the total number of SHGs (by Commercial and RRBs)	
Loan Outstanding (LO)	Total bank loan outstanding against SHGs (Commercial and RRBs)	
Training and capacity building (TC)	Training and capacity building given to SHG leaders/members	
Bank Branches (BB)	Total bank branches (commercial and RRBs)	Reserve Bank of India
<i>Control Variable</i>		
Total Deposits (TD)	Deposits-No of accounts (in thousands)	Reserve Bank of India

Source: Authors' compilation

4.2. Methodology

To examine the sustainability of SHGs in the states, the following simple model has been employed:

$$SHGs = f (BB, LD, LO, TC, TD)$$

For empirical analysis, a panel regression which enables the analysis of cross-sectional and time series data has been used. The reason to use panel regression is that this method accounts for individual

heterogeneity and also allows controlling variables since each firm has its own individual characteristics that may or may not influence the explanatory variables. The panel or cross-sectional time series data can be estimated either with fixed effect or with random effect models. In order to identify whether the fixed effect or random effect estimates are appropriate, the Lagrange Multiplier Test and the Hausman Test were applied. Specifically, the panel regression fixed effect and random effect models are given as follows in respective order:

$$SHG_{it} = \beta_1 BB_{it} + \beta_2 LD_{it} + \beta_3 LO_{it} + \beta_3 TC_{it} + \beta_3 TD_{it} + \alpha_i + u_{it} \quad (1)$$

$$SHG_{it} = \beta_1 BB_{it} + \beta_2 LD_{it} + \beta_3 LO_{it} + \beta_3 TC_{it} + \beta_3 TD_{it} + \alpha_i + \epsilon_{it} + v_{it} \quad (2)$$

The robustness of the panel estimate was checked using fully modified ordinary least squares (FMOLS) of Phillips and Hansen (1990). This method addresses the issues related to serial correlation and small sample bias. Last but not least, serial correlation test, heteroscedasticity test and normality test were also employed to ascertain the stability and efficiency of the estimates.

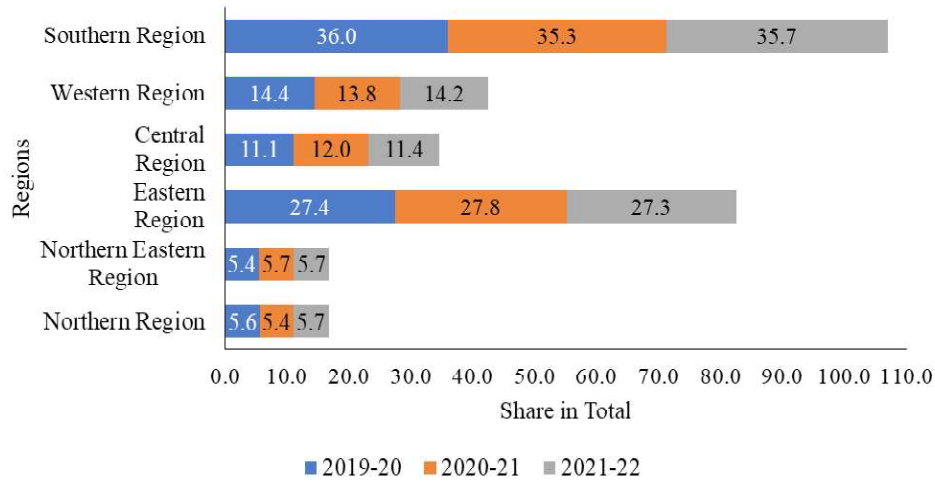


Figure 2: Region-wise Share in Number of Savings-linked SHGs

Source: National Bank for Agricultural and Rural Development, Status of Microfinance in India 2021-22

5. Results and Discussion

In absolute terms, positive acceleration was witnessed across all regions in the context of SHG savings linked with banks. However, as demonstrated in Figure 2, in terms of share in the total number of savings linked SHGs, the Southern region leads the surge with 36 percent of the rise accompanied by the Eastern region and the Western region with 27.4 percent and 11.4 percent rise respectively. Sharma (2021) in an attempt to study the loans disbursed points out severe disparities in loan disbursement among the regions. While the loan amount disbursed has increased since 2011-12, there was a big decrease in loan size in the central region whereby the southern region fared out well.

Next, to analyse the sustainability of SHGs in the context of financial inclusion across Indian states, equations (1) and (2) were employed. Table 2 displays the results of random effect panel regression estimates for the simple model as suggested by the Lagrange Multiplier and the Hausman tests.

Table 2: Regression Coefficients - Dependent Variables SHGs

<i>Variables</i>	<i>Random Effects</i>	<i>FMOLS</i>
	Coefficient	Coefficient
LD	0.28*	0.26*
LO	0.38*	0.37*
BB	0.08	0.52
TC	0.01	0.01
TD	0.05**	0.05
Constant	3.72	0.26***
Robustness test		
R-squared	0.41	0.98
F-statistic	185.36	-
Prob. (F-statistic)	0.00*	-
Durbin-Watson stat	1.64	-

Source: Authors' Calculation

Notes: Eviews 9 used for estimations t – statistics is displayed in parentheses

*significant at 1%, **significant at 5%, ***significant at 10%

The results of the study indicate that the loans disbursed to a number of SHGs and loans outstanding against the number of SHGs positively and significantly affect the number of SHGs linked with the bank saving program. This means that credit disbursement as well as the accessibility to various financial services and products lead to a rise in the number of SHGs. This implies that a good amount of assistance in the form of credit has been availed to SHGs under bank linked scheme. This assistance has played a major role in providing financial means to fund income-generating businesses, acquiring new skills, knowledge and technology, and creating opportunities to enhance the standard of living of the rural underprivileged people and uplift their financial status and means of livelihood. Besides, increased loan disbursement indicates SHGs were successful in creating a sense of unity and trust amongst the marginalised classes of the rural areas as their loans are collectively managed and processed by them. This has resulted in increased employment opportunities, reduced poverty, and augmenting community development overall. Further, this social cohesion also contributes in making it easier for the SHGs to administer them due to easy and better communication and collaboration with them.

An increase in loans outstanding against SHGs indicates that for SHGs the cost of the loan is low which means the SHG enterprises are encouraged to run their businesses and sustain in the long run.

On one hand, an increase in outstanding loans indicates increased outreach of SHGs amongst the underprivileged class of urban and rural areas. It simply indicates of enhancement in the trust of the masses in the assistance provided by SHGs in these areas. On the other hand, banks benefit from the increase in outstanding loans as they attain economies of scale and save a lot of administrative costs while catering to a larger audience. In other words, it becomes easier and more effective for the banks to streamline and monitor the disbursement processes and make it more cost-effective overall.

This is in line with the study by Bhanot (2016), and Sharma (2021) who concluded that the credit penetration with the support of SHGs has increased substantially which also infers that the SHG bank linkage program has been a game changer by providing financial services to the needy population and is successful at winning the trust of the poor masses and finally gaining momentum over the years. Further, the results also corroborate Sharma (2021) and Bhammi (2014) who infer that the growth rate shows a positive trend both for the number of SHGs as well as for the number of loans outstanding for the country although all the regions performed differently.

Further, the total number of bank deposits in a state has a positive impact on the number of SHGs. It has been observed that when people have bank deposit accounts, they are more inclined towards SHGs and the assistance provided. The reason being they are much aware of the banking procedures, facilities, products and assistance available for them. They place a greater trust in the banking system. Their banking habits aid them positively and they are much familiar and at ease with the digital and banking processes and systems to make use of them and benefit. Therefore, the banking habits of the masses positively impact the number of SHGs and beneficiaries in the region.

An increase in the number of branches has not contributed effectually towards the implementation of the schemes as expected. This shows that seldom, establishing branches in rural areas does not serve the intent till the staff is well trained, helpful and assists the uneducated poor masses with the procedures and formalities, wins their trust, and builds a long-term relationship with them. In spite of the fact that so many schemes and facilities are designed for the upliftment of these underprivileged rural masses, they do not avail benefit from them, merely due to the aforementioned reasons. As indicated by Sinha (2021) and Bhanot (2016), the branch network is quite uneven, and hence unequal penetration of branches leads to unequal growth of the number of SHGs. This is an indication that merely having more bank branches in rural areas would not serve the purpose unless the beneficiaries place their trust in the banking system as a whole. Unless they have banking habits it is difficult to bring them into the financial assistance umbrella of SHGs.

Surprisingly the training given to SHG members by NABARD does not have an impact on increasing the number of SHGs. The training needs to be more effective, rigorous, and evenly imparted in all the states. It has been observed that in a few states, the training imparted has delivered results whereas in the rest of the states either the training is not imparted or is imparted to very few, which amounts to not creating any impact. Besides, the quality of training matters the most since training will equip the masses with the knowledge to build a business. Regular follow-up and ongoing support of mentors after the training is also of utmost importance in the success of the training as well as the business. As emphasized by Reddy and Reddy (2012) in his study there is a dire need to enhance the quality of the SHG movement putting a bigger focus on enlarging the scope of its engagement in

different aspects of the rural masses. This study stresses the fact that the agenda for SHG should be redefined to include bigger dimension and engagement of the rural masses.

6. Conclusion and Recommendations

The present study attempts to understand the sustainability of SHGs across Indian states by empirically examining them in the context of financial inclusion. This study tries to investigate the factors affecting SHGs by using annual data of 27 states for the period from 2015-16 to 2021-22. To analyze this, the study uses the panel regression method along with the fully modified ordinary least square method. The results indicate that the number of SHGs linked to banks increases if more loans are disbursed to them. Also, the rise in loans outstanding against the number of SHGs indicates the sustainability of SHGs. Further, a rise in the total number of bank deposits in a state positively increases the number of SHGs-BLP. Contrarily, the number of bank branches in a state and the training imparted to SHG leaders or members does not have any impact on the rise in the number of SHG-BLP.

The SHGs will need to look beyond fulfilling the targets assigned to them. They must create an ongoing support system that highly focuses on regular mentoring and follow-up with the beneficiaries. This system should be well designed such that it can educate the masses and is capable of providing alternatives and suggestions by experts for addressing any constraints of resources or market dynamics. The policymakers need to look into the possibility of creating separate funds that could aim at developing the required infrastructure for building businesses and manufacturing units of SHGs. Also, more awareness should be brought amongst the masses regarding the usefulness of SHGs and the important role they play in community development at local, regional, and national levels.

Note

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A Critical Review of Herd Behaviour in Capital Markets: A Bibliometric Analysis

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Bibliometric analysis, Herd behaviour, Investment behaviour, Economic crisis

JEL Classification

G40, G41, G410, G10

Abstract: During recent few years, a growing number of associated researches on herd behaviour are being published with respect to investment in stock markets, forex market, etc. Therefore, a bibliographic analysis of such publications may provide a path to some new topics and future research trends. The global literatures between 1983 and 2022 were scanned using fifteen terms related to herd behaviour in finance as keywords to reach the related publications. After screening, 1439 publications related to herd behaviour were identified. The term “Herding” appeared as the most frequent keyword. The highest ranking journal was SSRN Electronic Journal and the most cited journal was Journal of Empirical Finance. Thomas Lux from Kiel University is the most cited author. United States made the outstanding contribution within this important area. Current growth trends are predicted to rapidly increase the number of global publications on Herd Behaviour. Financial Literacy, crypto-currency market and mental accounting may possibly be the hotspots in the future.

1. Introduction

Herd behaviour is one of the psychological biases in the arena of behavioural finance which means imitating the actions of other people. In financial markets, investors might mimic the actions and decisions taken by others regarding investment. They do not make decisions on the basis of the information available in the market which leads to changes in the value of securities. Thus, presence of herding causes prices to deviate from their ultimate value and provide opportunities for profitable trading. Christie and Huang (1995) has described the herd behaviour as for those who used to follow market consensus even if they don't agree to it and ignoring their own analysis. Herd behaviour can destabilize the market by shifting the securities far from its fundamental value as prices of shares not

only reflect the rational decisions of investors but also irrational investment decisions taken by them (Demirer and Kutan, 2005).

However, there has not been much review analysis conducted on Herd Behaviour of investors. The study has concentrated the analysis on investment, business and economy. As it has been found that there is more need to find out the research gap so that future trends could be identified and more information can be acquired from these references. Therefore, the Bibliometric analysis was performed to provide a broader understanding of Herd Behaviour in finance and direction of future research topics. Bibliometric analysis has been defined by different researchers in their own ways as follows:

Bibliometric is a statistical technique which can quantitatively analyse the research papers concerning one special topic via mathematical ways (Chen, Dubin & Kim *et al.*, 2014).”Bibliometric analysis is a quantitative research approach that employs statistical and computational methods to analyze and visualize patterns and trends in the scientific literature” (Nidhi and Garima, 2023). In the words of Saini and Sharma (2022), “It is a statistical method which is used for analysis of books, articles, documents and other publications on basis of scientific data”.

It can also access the quality, analyse the key areas of researches and predict the future direction of the studies. The Dimensions online database contains almost all the significant and relevant research papers which also offer built-in analysis tools to produce representative figures. Search results from Dimensions database can be exported to software such as VOSviewer for further analysis.

2. Literature Review

Most of the researches regarding herd behaviour were mainly concentrated on the financial markets. Many authors focused on finding out the presence of herd behaviour in this research field in developed countries (Nahmeret *et al.*, 2019; Cai *et al.*, 2017; Lan, 2014; Kremer and Nautz, 2013; Chiang *et al.*, 2013; Henker and Mitsios, 2006). Less emphasis has been granted to the analysis of herd behaviour in the emerging markets (Lao and Singh, 2011; Kumar & Bharti, 2017; Jose *et al.*, 2018). Some authors found the presence of herd behaviour in the stock market (Dhall and Singh, 2020; Balcilar *et al.*, 2014), commodities market (Klotzle *et al.*, 2019), crypto-currency market (Kaiser and Stockl, 2019; Ballis and Drakos, 2019). While some authors didn't found the existence of herd behaviour among investors in the stock market (Kanojia, Singh & Goswami, 2020; Mertzanis and Allam, 2018; Demirer and Kutan, 2006), commodities market (Babalos *et al.*, 2015).

Bibliometric analysis allows to evaluate the impact of scientific researches, citations and publications, and provides direct reference to new research trends (Moreno and Rosselli, 2012). In the past few years, bibliometric analysis along with systematic literature review have supported many researchers to explore new research trends over the years within a specific area of research and to detect future research trends in the areas such as international business (Rialp *et al.*, 2019), industrial marketing (Valenzuela-Fernandez *et al.*, 2019), business models (Coombes and Nicholson, 2013), entrepreneurship (Lopez-Fernandez *et al.*, 2016), economics (Bonilla *et al.*, 2015) and political economy (Amigueta *et al.*, 2017).

3. Research Methodology

The comprehensive literatures about Herd Behaviour published between 1983 and 2022 have been scanned in the Dimensions database. The searched terms applied to identify the nearest matching

publications consists “herd behaviour”, “herd behaviour in stock market”, “herding behaviour in stock market”, “herd behaviour in commodities market”, “herding behaviour in commodities market”, “herd behaviour in crypto market”, “herding behaviour in crypto market”, “herd behaviour in mutual fund”, “herding behaviour in mutual fund”, “herd behaviour in finance”, “herding behaviour in finance”, “intraday herding behaviour”, “herd behaviour in investment”, “herding behaviour in investment” and “cross sectional absolute dispersion herding behaviour” which were used as the keywords in the title and abstract.

The information for the documents that meet the requirements included year of publication, journal, title, source, author, affiliation, organization, country, abstract and counts of citation that were exported in CSV format. The date of data retrieval was 05th August, 2022. VOSviewer (version 1.6.18) was employed to analyse the Co-authorship, Co-occurrence, Citation and themes.

4. Data Analysis

4.1. Bibliographic Analysis of Publications

Overall, 2996 publications on the topic of Herd behaviour were identified in Dimensions database between 1983 and 2022 which included 1320 duplicate publications and 237 publications were removed which were related to live stock herd behaviour and not relevant to the current concerned bibliometric analysis based on herd behaviour in financial markets, businesses and corporates. High weightage of publication were found of keyword “herd behaviour in the stock market” on dimensions database

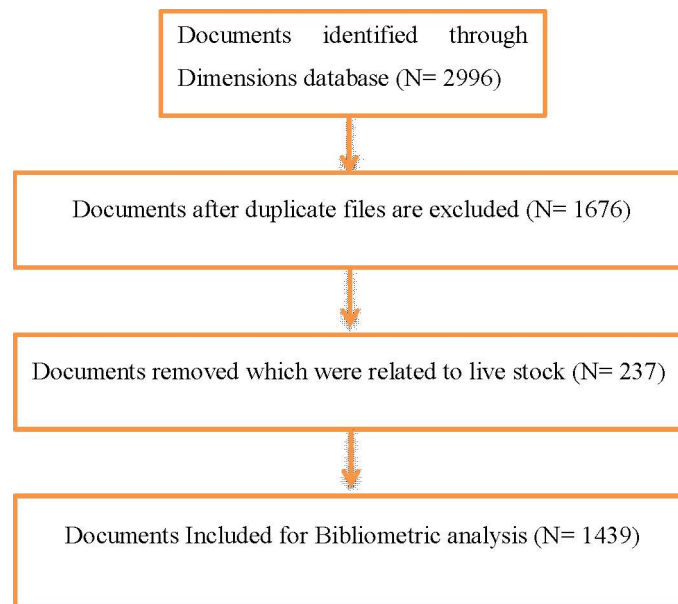


Figure 1: Documents Screening Flow Diagram

which is 994 (69%) out of 1439 publications. So it can be concluded that herd behaviour is more stock market phenomenon that is executed by the investors.

4.2. Publications Output Year-wise

The filtered 1439 documents related to herd behaviour in finance extracted from Dimensions database and included in bibliometric analysis cover the period from 1957 to 2022. The quantity of publications before 1999 was low which resulted in inclusion of years with their number of publications from 2000 to 2022 in the graph. From 1999, the number of publications started growing. Following bar graph presented below describes the number of publications over the previous 22 years.

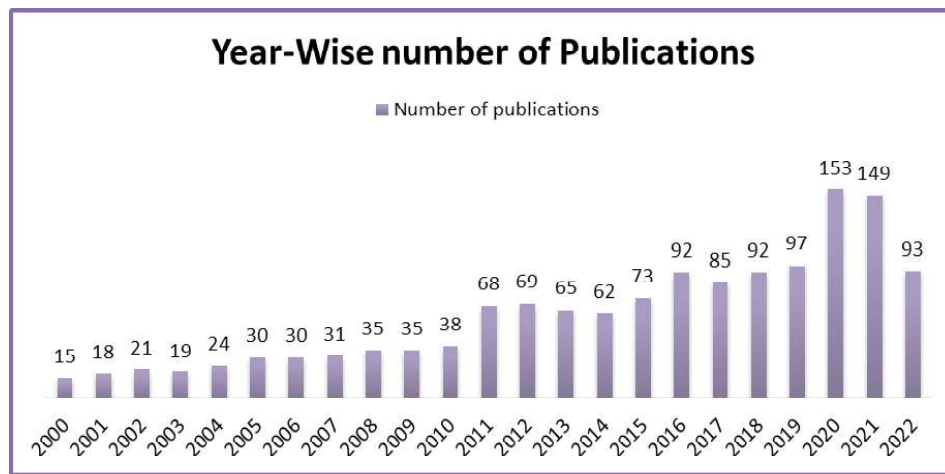


Figure 2: Year-wise Publications

From the figure 2, it can easily be observed that maximum numbers of publications were found in the years 2020 and 2021 having 153 and 149 papers or articles published respectively. The pandemic becoming the obvious reason for such a high quantity of publications in these two years as most of the publications on herd behaviour based on COVID-19, pandemic, etc. were seen in these year. As it can be observed that after 2010, the number of publications spurted from the year 2011 consisting 68 number of publications. However, the quantity of papers found low in 2022 with only 93 publications but it can be said that the year is not completed yet which means the process of publishing is in running phase for the year 2022.

4.3. Keywords

The size of a node denotes the frequency of occurrence and the curve between the nodes indicates the co-occurrence of nodes within the same publication. Lesser the distance between nodes, the larger will be the quantity of their co-occurrence.

As the records in Dimensions database does not contain information of keywords so most frequent words occurred more than 10 times in the published papers have been enrolled in the final analysis

from the field titles and abstracts. Of the 24,483 most occurred words, 696 met the threshold. In the top 200 most frequent words the keywords appeared most were “investment decision” in blue from cluster 3 (total link strength 503) followed by “Herding behaviour” in red from cluster 1 (total link strength 373) and “market condition” also in red from cluster 1 (total link strength 344).

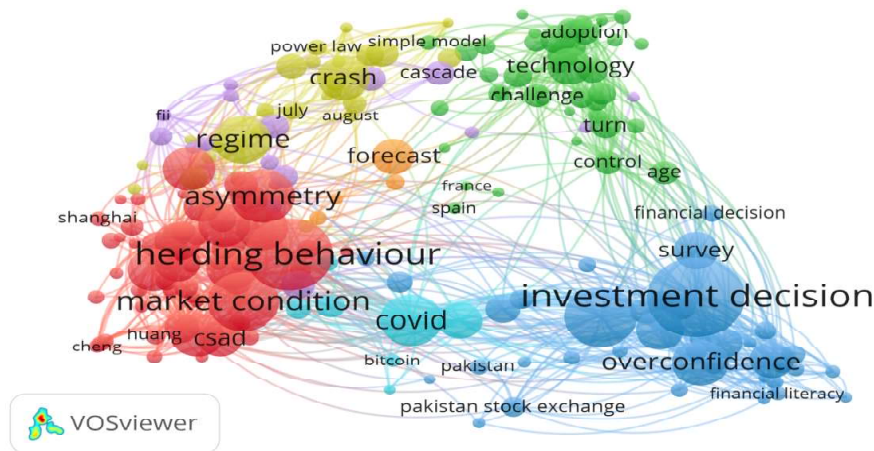


Figure 3: Bibliometric Analysis of Co-occurrence of the Keywords

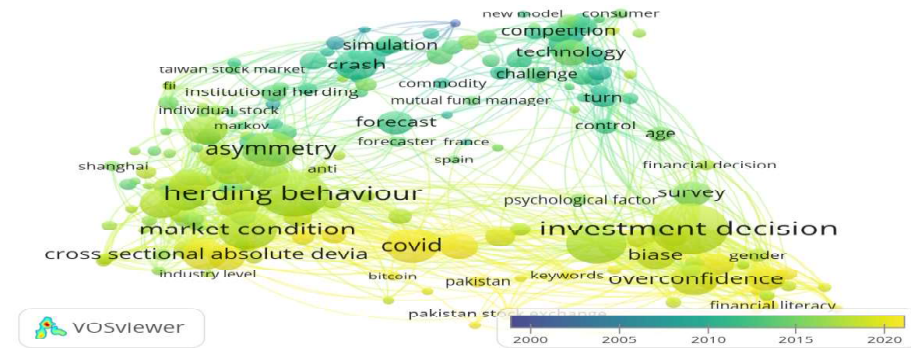


Figure 4: An Overlay Visualization of Keywords

Indicator shows the current keywords for a period of 22 years from 2000 to 2022 from purple to yellow. It can be seen that few researches were conducted during initial years of 2000 decade. Keywords relevant to the concerned topic have gained its importance since 2011 as more researches have been conducted from this year. Economic theory, Asian crisis, financial analyst were some keywords that were used frequently before 2010 and during initial years after 2010, commodity, forecast, information cascade, volatility clustering, positive feedback trading were some keywords that were prominently used by researchers in their study. However, the studies on herding behaviour, market condition,

investment decision, equity market, market return, market volatility, trading volume were mostly conducted between the years 2015 and 2018. So it can be claimed that the term herding behaviour found its relevance as an important research area since 2015. When it comes to most recent keywords used during recent years in the latest publications on herd behaviour were crypto-currency market, COVID, pandemic, bitcoin, financial literacy, mental accounting. These keywords may become new research topics in the field of herd behaviour in finance.

4.4. Bibliometric Analysis of Publications and Citations

Out of 636 journals, 76 met the threshold limit of at least three numbers of documents of a source and at least ten citations per journal.

Figure 5 represents the top 10 most active journals. (A) The journals having most-cited papers in the area of herd behaviour in finance; (B) the overlay visualization of most cited journals in the field of herd behaviour in finance over the years. (C) The journals with highest number of publications

In the Figure 5(A), the most cited journal was Journal of Empirical Finance which has been cited for 1202 times (total link strength 144) followed by Journal of Banking & Finance cited 942 times (total link strength 161). Some other most cited journals were European Financial Management, The



Figure 5 (A)

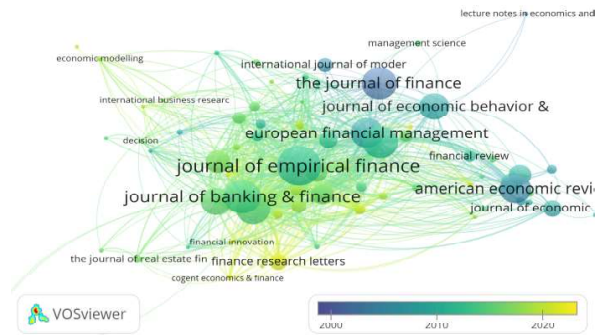


Figure 5 (B)

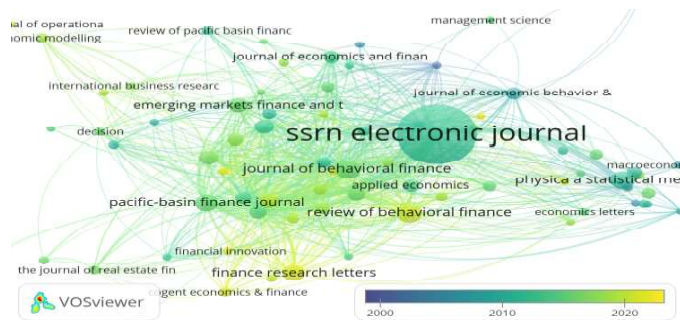


Figure 5 (C)

Journal of Finance, American Economic Review. So, it can be interpreted that these journals publish quality research papers which have high relevance in their research field. In Figure 5(B), the overlay visualization of most cited journals over the years has been represented and most recently cited journals which may get heavy number of researches published were found to be Millennial Asia with 25 citation counts (total link strength 59) followed by International Journal of Financial Studies which has 11 citation counts (total link strength 30), Finance Research Letters has 242 citation counts (total link strength 128), Financial Innovation has 39 citation counts (total link strength 26), Review of Behavioural Finance with 123 citation counts (total link strength 212). As it can be observed from figure 5(C) that SSRN Electronic Journal has been the highest publishing journal with 236 number of publications (total link strength 516) followed by Review of Behavioural Finance with 22 publications (total link strength 212).

4.5. Bibliometric Analysis of the Citations

The citation of authors. (A) Out of 2730 authors, 106 met the threshold of at least three documents per author and minimum number of five citations of each author. Eighteen clusters were presented in different colours. Thomas Lux in the purple cluster is the most cited author (1073 times). Ashish Kumar has been found as most recent author with 29 citation counts. (B) The citation of organizations. Out of 868 organizations, 56 met the threshold of least number of documents to be five and at least ten number of citations of each organization. Drexel University being the most cited organization with 1151 citation counts (total link strength 301) and has made its contribution in the concerned research field around the year 2013; (C) The citation of countries. Out of 73 countries, 51 met the threshold of minimum three documents of each country and minimum five citation of each country. United States is the most cited country cited 7244 times (total link strength 2174). The major number of studies in United States found after 2010. An overlay visualization of citation of countries has been provided and it has been found that many researches have been conducted in India during 2018. For future trends in the citation of countries, Nepal is the most recent country with 5 citation count (total link strength 13) Different clusters are indicated by different colours and the counts of citation are represented by the size of circles.

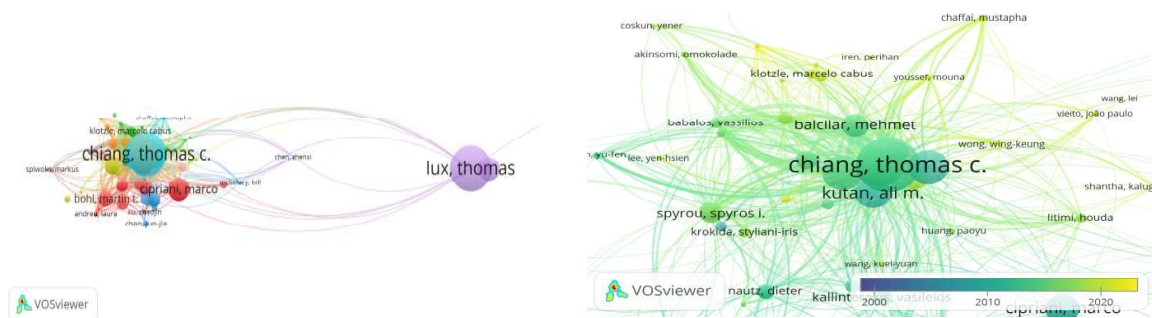


Figure 6 (A): Citation of Authors and an Overlay Visualisation

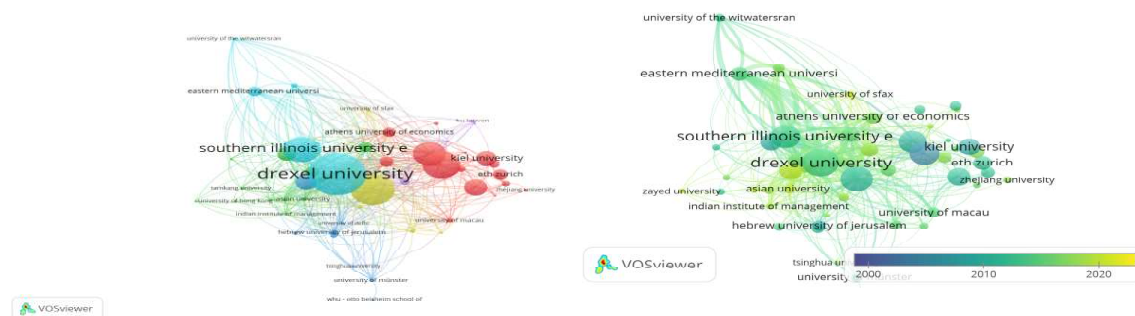


Figure 6 (B): Citation of Organizations and an Overlay Visualisation

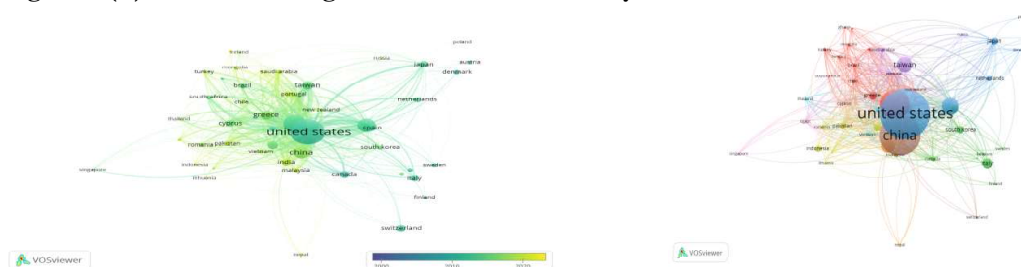


Figure 6 (C): Citation of Countries and Overlay Visualisation

Table 1: Citation Counts of top 10 Journals, Authors and Countries

Journals	Number of Citations	Authors	Number of Citations	Countries	Number of Citations
Journal of Empirical Finance	1202	Thomas Lux	1073	United States	7244
Journal of Banking & Finance	942	Thomas C. Chiang	970	United Kingdom	3160
SSRN Electronic Journal	858	Rýza Demirer	619	Germany	1730
Journal of International Financial Markets, Institutions and Money	817	Simone Alfarano	383	China	1466
European Financial Management	723	Marco Cipriani	376	France	905
Pacific-Basin Finance Journal	671	Antonio Gguarino	376	Greece	732
International Review of Financial Analysis	447	Mehmet Balcilar	289	Taiwan	625
International Review of Economics & Finance	390	Fotini Economou	274	Australia	568
Journal of Behavioral Finance	345	Didier Sornette	258	Canada	442
Review of Behavioral Finance	123	Rýza Demirer	233	India	401

Source: Authors' Own Compilation

Six hundred and thirty four journals have published articles on herd behaviour of which 37 have published five or more papers with minimum 5 citation counts. It has been observed from table 1 that

the publications cited maximum numbers of time are constituents of top three journals namely the Journal of Empirical Finance with 1202 number of citation counts, the Journal of Banking & Finance with 942 and the SSRN Electronic Journal with 858. Among all, the Journal of Empirical Finance has found to be the most cited journal from the data extracted from Dimensions database and analysed on VOSviewer. Out of 2728 authors, 25 met the criteria of minimum 5 citations per author. Among top 10 authors, Thomas Lux emerged as the author who has 1073 maximum number of citation counts. Among authors, 41 met the threshold of minimum 10 citation counts for each country out of 74 countries and found United States to be the country which has been highly cited with 7244 times of citation counts in various articles.

5. Results and Discussion

From the present study, 1447 publications about herd behaviour indexed in Dimensions database were examined. The published articles included the following three facets: Herd behaviour in finance market, market condition and investment decision by investors. As the most frequent term, “Herd behaviour” found to be strongly linked with “stock market” and “investment decision”. United States has made the outstanding contribution within this important area. Herd behaviour in the stock market during pandemic, crypto-currency market may be hotspots in the future.

The global literatures about Herd Behaviour were scanned in the Dimensions database published between 1983 and 2022. Fifteen terms have been used as the keywords in the title and abstract field to identify the nearest matching publication related to herd behaviour in financial sector. The data regarding documents was extracted on 05th August, 2022 in comma separated value format and VOSviewer (version 1.6.18) which is one of the significant software to conduct bibliometric analysis has been employed to analyse the Co-occurrence of keywords, future research trends, Citation, Co-authorship and themes.

Out of 2996 publications on the topic herd behaviour in finance, 1320 documents were found duplicate and 237 publications were removed due to their non-relevance to the concerned topic. A major portion of research articles relate to the herd behaviour in the stock markets (994) out of 1439 publications which is 69% of the total publication selected for analysis.

It has been known that the Dimensions database does not contain the information regarding keywords used by authors in their respective articles as the keywords are available with other databases such as Web of Sciences, Scopus, etc. so most frequent words occurred more than 10 times in the published papers have been analysed from the field titles and abstracts. Of the 24,483 most occurred words, 696 met the threshold and found that “herd behaviour”, “investment decision” and “market condition” were most frequently occurred keywords. It has also been resulted that the crypto-currency market, COVID, pandemic, bitcoin, financial literacy, mental accounting are the most recent keywords that has been occurred in the latest publications. These keywords may turn out to be hot topics for further research trends for instance the outbreak of COVID-19 has impacted the financial sectors also along with the health of the people in recent couple of years so many researches have been identified on COVID-19 since 2020. More emphasis has now been provided on the financial literacy of investors because one of the reasons could be investors not containing appropriate knowledge of share prices

and respective company activities and decisions leads them to follow the crowd which affects the market severely. Mental accounting is a new concept which needs more enhancement and exposure in the research field.

On performing bibliometric analysis on citations and publications of journals, authors, organisations and countries, it has been found that the Journal of Empirical Finance which has been cited for 1202 times was most cited journal. Millennial Asia followed by International Journal of Financial Studies, Finance Research Letters were some journals which include the journals cited the most in recent years. SSRN Electronic Journal has been the highest publishing journal with 236 number of publications followed by Review of Behavioural Finance which includes 22 publications. Thomas Lux has resulted to be the most cited author with 1073 citation counts and the most recent author cited is Ashish Kumar with 29 citation counts. Drexel University is the most cited organization and United States has resulted to be the most cited country. Nepal is being seen as the emerging country which is being cited. Year-wise number of publications have been observed and found that the maximum numbers of articles on herd behaviour in finance have been published during the years 2020 and 2021 which are majorly based on the pandemic that affected the global markets.

6. Conclusion

During recent years since 2016, growing number of academic papers have been published. Hence, it becomes imperative to evaluate the significance and eminence of such a increased number of research articles and extract significant information with some impactful output. Research in behavioural finance plays a significant role in understanding the concept of herd behaviour thoroughly. Since the concept of herd behaviour is not very new, still most of the investors tend to imitate the investment decision of others and do not follow their own consensus and available information. This may be the reason that most of the recent studies are concentrated on financial literacy so that investors get the knowledge of market behaviour and become able to take their investment decision by themselves. Mental accounting, crypto-currency markets are still future research directions. The numbers of publication in 2022 are lesser as compared to 2020 and 2021 being the fact that some more research articles on the topic can be published during the remaining months of 2022 and some more exposure must be provided in the new research trends on the topic so that the number of publications grows in increasing trend.

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Impact of Macro-Economic Factors on Indian Commodity Futures

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JEL Classification

C01, C32, F62, G13, G14

Abstract: India being an emerging nation is one of the largest consumers of metal, energy and bullion which makes the commodity markets' role crucial. The study looks at the price trend of spot and futures of a few chosen commodities as well as the macroeconomic variables' effect on the Indian commodity futures market. The study considered eleven MCX iCOMDEX composite index commodities and the macroeconomic measures that were used are the WPI, CPI, IIP, M3, and ER (INR-USD). To analyse the study's objectives, line charts, ADF tests, PP tests, Granger causality tests and multiple regression statistics, were employed. As to the study's findings, only the log futures prices of aluminium, cotton, crude oil, and lead are significantly impacted by macroeconomic variables such as ER, Nifty 50, M3, and MIBOR. This study will give investors, portfolio managers, and market participants a guideline for estimating the volatility risk in commodities futures.

1. Introduction

In India, the gradual change of commodity markets has been critical for both the country's broad economic distribution and its ties with financial sector. With the advent of time and introduction of futures market, the prices have become more volatile and unstable which gives an opportunity to the investors for easy entry and exit. Imports and Exports are often considered to be the main determinants of the production of an economy (Nirmala and Vadivel, 2019). This shoots up the demand for goods and widens their price determinants i.e., macroeconomic variables. So, the supply and demand dynamics in the market drive these commodity futures pricing (Chowdri, 2020). Variables affecting the globally traded commodities increase its price volatility which may be controlled by the commodity futures market (Shao *et al.*, 2019). Better price discovery is possible when the commodities market transmits price information with sufficient efficiency (Gupta, 2018). However, the evaluation of the price volatility of the Indian commodities futures market is significantly influenced by both domestic and global

economic factors (Sreenu *et al.*, 2021). The exchange rate i.e., INR-USD has an immediate impact on 15 exporting industries and a longer-term impact on 9 industries (Iqbal *et al.*, 2023). Commodity prices are also indirectly impacted by other investment options like money market instruments and stock market investments. So, to safeguard the commodity price risk volatility, the commodity markets have to disseminate the macroeconomic information as well. This raises queries on commodity market's efficiency regarding its reactions towards macroeconomic factors. This research aims to analyse the effects of several macroeconomic factors on the commodity market in India.

2. Important Macro-Economic Factors Affecting the Indian Commodity Futures

There are several economic factors which affect the commodity futures in India. Following are the list of such factors:

2.1. Wholesale Price Index (WPI)

WPI records the average movement of wholesale prices of goods and in India, the changes in the WPI are used as a barometer of inflation for the agricultural commodities. For an instance, the long-term relationship between castor, cotton, and soyabean is illustrated by the cointegration between their monthly near-month futures prices and monthly wholesale prices. (Sehrawat and Kumar, 2022).

2.2. Consumer Price Index (CPI)

CPI calculates the changes in household spending over time for a variety of products and services. CPI is expressed for a population in three ways: CPI-Urban, CPI-Rural, and Consolidated CPI for Urban + Rural. Research demonstrates that aggregate supply shocks in energy commodities such as aluminium and copper can have a major impact on CPI (Wei, 2019).

2.3. Index of Industrial Production (IIP)

IIP is a combined indicator that represents the magnitude of production in India's industrial sector by measuring short-term variations in the volume of production of a group of industrial goods during a certain span. A rise in IIP can potentially alleviate financial market volatility, in turn minimising volatility in the commodities market by boosting public confidence (Joarder, 2018).

2.4. Broad Money (M3)

The total supply of money that is used by the general people, including households, enterprises, regional governments, and other entities, is known as the money supply. In India, long-term time deposits with banks except from interbank deposits are included in the M3, together with the M1 (currency components and demand deposits). The central bank shall exercise caution while adjusting the money supply in the market since an excessive rise could adversely affect investments (Khan and Khan, 2018)

2.5. Mumbai Inter-Bank Offer Rate (MIBOR)

MIBOR is the interest rate that banks in the Indian interbank market can borrow money at, in marketable size, from other banks. Most money market transactions in India also use it as a benchmark rate.

Stability in MIBOR will increase exports and reduce the import activities in India (Rajaswaminathan *et al.*, 2015).

2.6. Exchange Rate (INR-USD)

The foreign exchange rate (Forex Rate), which is set in the Forex market, is the rate at which one country's money is converted into another country's currency. INR-USD conversion rate is the amount needed to convert one Indian rupee to one USD. The exchange rate is a crucial macroeconomic indicator having a significant impact on how agricultural commodity prices are linked over time (Harri *et al.*, 2009).

2.7. Nifty 50 Index

The NSE's benchmark index, NIFTY 50 which consists of 50 stocks is owned and managed by NSE Indices, formerly known as Indian Index Services and Products Ltd. (IISL). Nifty 50 had negative relationship with Comdex Futures and Energy Futures during the controlled state, while a positive correlation during the crisis period. However, there is inverse relationship of gold with equity markets (Shalini and Prasanna, 2016). Thus, the main macroeconomic factors such as WPI, CPI and IIP serve as representative for inflation, Broad money (M3) and MIBOR are defined for money market. The exchange rate is depicted by INR-USD and NIFTY 50 as a substitute investment option. With these selected variables and understanding its importance, the study aims to look at how macroeconomic factors affect commodities futures prices.

3. Review of Literature

India being one of the fastest-growing emerging economies on the planet, depends on an efficient commodity market for higher economic growth which is very much impacted by commodity prices (Legomsky, 2008). By analysing quarterly data for Eastern Europe and the former Soviet Union from the first quarter of 1970 to the third quarter of 1992, it was identified the main economic factors influencing commodity prices are the global demand, commodity export countries and commodity supply (Borensztein and Reinhart, 1994). The significance of 187 macroeconomic and financial, real and notional indicators from industrialised and developing nations on the NYMEX West Texas Intermediate (WTI) oil futures returns were examined from November 1993 to March 2010. It was discovered that the inflation adjusted macroeconomic measures of developing countries have major influence on crude oil price, and the daily crude oil futures price volatility has an adversely significant impact on GDP (Yannick and Benoît, 2011). Using the Granger-Causality test and Johansen cointegration test, it was discovered that, between 1960 and 2005, there was a short- and long-term relationship among oil prices and four macroeconomic indicators i.e., GDP, CPI, unemployment rate, and equity prices (Lescaroux and Mignon, 2009; Mohanty *et al.*, 2023). Similarly, agricultural commodity prices in the USA like Corn, Soybeans, Soybean oil, Cotton found correlated with exchange rate, crude oil price, over a study on an eight-year period from January 2000 to September 2008, with an exception of Wheat and that the association of agricultural commodity prices over time is significantly influenced by the exchange rate (Harri *et al.*, 2009). Regression analysis on the USA Gold and Silver Futures from

January 1992 to December 1995 showed that the unemployment rate and capacity utilisation affected the prices of both metals, but the CPI, GDP, and PPI solely affected the price of gold (David *et al.*, 2000). On investigating the impact of monetary policy, financial market data and economic conditions on the volatileness of Indian commodity futures market applying GARCH-MIDAS model, revealed that both national and global macroeconomic variables have less impact (Sreenu *et al.*, 2021). An analysis on the relationship among macroeconomic variables like interest rate, exchange rate, IPI and Crude Palm Oil Futures (FCPO) from January 1999 to December 2019 indicated that these variables had a major long-term impact on FCPO prices, with interest and exchange rate having a turn down impact and IPI showing a positive impact (Ahmed *et al.*, 2020). A study on the impact of business cycle, monetary environment, and financial market sensibility on the volatility of Gold, Silver, Platinum, and Palladium from January 1986 to May 2006 showed no impact, indicating that they act differently and cannot be regarded as a single asset class (Batten *et al.*, 2010). Granger Causality analysis of the volatility of crude oil futures prices on the NYMEX for macroeconomic information from 1984 to 2004 revealed that crude oil prices respond negatively to macroeconomic data and have an adverse effect on future GDP (Guo and Kliesen, 2005). A study between January 1997 and June 2009 in US, notes that commodity prices including those for energy, agricultural commodities, base metals, and precious metals are less responsive to macroeconomic news compared to financial assets, and that commodities behave asymmetrically to adverse economic news (Roache & Rossi, 2010). Another study by incorporating GARCH-MIDAS model to analyse the effect of the macroeconomic factors on the variance of futures' return volatility demonstrated that the level of macroeconomic measures significantly affects the volatility of Chinese futures' return (Liu *et al.*, 2019). The expansion of the commodity futures market has a notable impact on inflation, although this effect may diminish as the market matures (Sahi and Raizada, 2006). The aforementioned research emphasises the significance of macroeconomic variables effects on commodity futures prices, aiding the paper's goal. The majority of earlier research has been conducted in the global commodity market with an emphasis on analysing how various macroeconomic factors affect the prices of various commodities. While in India, studies tend to focus more on theoretical concepts such as development of commodity market or changes in policy or empirically on the link between the spot and futures markets. There are less Indian studies that examine how macroeconomic variables affect Indian commodities futures that too with one or few variables. To gain better knowledge of commodity trading and the impact of macroeconomic factors on commodity futures, the authors tried to examine the major constituent commodities over an extended period of time with daily trade from all angles.

4. Relevance of the Study

India being a resource rich country, have a large demand for consumption, production, and commerce. India is the world's greatest consumer of precious metals (bullion and silver), metals (copper, zinc, lead, etc), and agricultural items (cotton, maize, wheat, turmeric, dairy products, etc). The volume of trade in the Indian commodity market has increased and indicates a positive growth (Bansal *et al.*, 2014). The growth is influenced by various factors, including demand and supply changes, government policies, and RBI policies. For instance, the Indian imports and exports increased tremendously after

1991 reform and so importing of goods affects the exchange rate which in turn impact the commodity prices. Various other investment avenues also indirectly impact the commodity prices. Hence, studying about the impact of various macroeconomic variables on Indian commodity futures is important.

5. Objectives of the Study

Following objectives are aimed at:

- To understand the significance of macro-economic factors affecting the commodity futures.
- To examine the price trend pattern of commodities spot and futures prices in India.
- To analyse the impact of macroeconomic variables on the Indian commodity futures market.

6. Scope of the Study

The scope of the study is limited to iCOMDEX composite index of MCX which validate to the universal best standards set by the International Organisation of Securities Commissions (IOSCO). In India, there are 21 commodity exchanges, 16 of which are regional and 6 of which are national. As of June 2015, 99.84% of all commodities traded were on national commodity exchanges. MCX is the top commodity derivatives exchange in India among the six national exchanges, holding a 92.9% market share based on the value of commodity futures contracts traded in the FY 2021–22. Besides that, the study also confines to only seven macro-economic variables i.e., WPI, CPI, IIP, NIFTY 50, M3, ER (INR-USD), and MIBOR.

7. Hypothesis of the Study

H0: There is no significant impact of the macroeconomic variables on the commodity futures prices.

H1: There is significant impact of the macroeconomic variables on the commodity futures prices.

8. Limitations of the Study

- MCX traded commodities are selected as it holds the major share in commodity derivatives exchange traded platform
- The study is confined to the traded contracts of the MCX-iCOMDEX (Composite Index) commodities during the period of study.
- The period for the study is limited to 9 years (2012-13 to 2020-21).
- Also, only seven variables i.e., NIFTY 50, WPI, CPI, IIP, M3, ER and MIBOR are selected for the study.

9. Research Methodology

9.1. Research and Sample Design

The study is descriptive and analytical in nature It is analysed using secondary data collected from MCX's official website and other official sources. The study has considered MCX iCOMDEX Composite Index for the analysis. It constitutes of 11 commodities such as Aluminium, Copper, Cotton, Crude

Palm Oil (CPO), Crude Oil, Gold, Lead, Natural Gas, Nickel, Silver and Zinc. MCX iCOMDEX indices derive values from prices of futures contracts traded on MCX. The futures and spot prices of selected commodities are collected from official website of MCX (www.mcxindia.com).

The macroeconomic indicators i.e., WPI, CPI, IIP, M3, ER (INR-USD) data are collected from RBI website, Office of the Economic Adviser, Ministry of Commerce and Industry, GOI (<https://eaindstry.nic.in/>), National Statistical Office (NSO), Ministry of Statistics and Programme Implementation, Government of India (www.mospi.gov.in), MIBOR data is collected from Financial Benchmarks Pvt Ltd (www.fbil.org.in) and National Stock Exchange (NSE) and Nifty 50 spot prices from official website of NSE (www.nseindia.com).

9.2. Data Period

The study evaluated daily data for a few chosen commodities over a nine-year period, from April 1, 2012, to March 31, 2021. The annual macro-economic factors data are also gathered for 9 years from FY 2012-2013 to FY 2020-2021 so as to evaluate its impact on the commodities futures.

9.3. Tools for Analysis

For analysing the effect of macro-economic factors on Indian commodity futures, appropriate models are used to answer the study objectives. Line graph is used to study the commodities futures and spot prices pattern in India for the period taken. These commodity futures prices and macroeconomic variables are measured in different denominations. Reliability of the analysis is contingent upon all the variables being on the same base. So, all the variables are transformed to log values, except for MIBOR, which is expressed as a percentage.

The research data must be checked for unit root before moving on to the models as it is a time series data. In the random process of $X_t = \tilde{n}X_{t-1} + u_t$, the unit root test checks whether $\tilde{n} = 1$. If the estimated \tilde{n} is statistically equal to 1, then X_t is said to be non-stationary.

To check the stationarity of the futures prices of selected commodities, Augmented Dickey-Fuller (ADF) Test and Phillips Perron (PP) Test are used.

$$\text{ADF test regression: } \Delta X_t = \beta_1 D_t + \delta X_{t-1} + \sum_{i=1}^m a_i \Delta X_{t-i} + \varepsilon_t \quad (1)$$

Where X_{t-1} is the initial lagged value to X_t , ΔX_{t-1} is the shift in X_t 's lagged value, D_t - intercept ε_t is a pure white noise error term, and ΔX_t is the dependent variable. The time series is non-stationary, according to the null hypothesis, H_0 , which is $\delta = 0$.

$$\text{The PP test regression is: } \Delta X_t = \beta_1 D_t + \delta X_{t-1} + u_t \quad (2)$$

Where, ΔX_t - regressand factor, D_t - intercept, X_{t-1} is the initial lagged value to X_t and u_t is a pure white noise error term. If $\delta = 0$ for H_0 , then the time series is non-stationary.

Multiple regression is used to capture the impact of macroeconomic variables over commodities futures. Using the least-squares method, the sample regression coefficients ($a_0, a_1, a_2,$ and a_3) are computed as estimates of the population parameters ($\alpha_0, \alpha_1, \alpha_2,$ and α_3). Multiple regression's equation is as follows:

$$CFPt = a_0 + a_1WPI_t + a_2CPI_t + a_3IIP_t + a_4ER_t + a_5M3_t + a_6NIFTY50_t + a_7MIBOR_t + u_t \quad (3)$$

Where CFP- Commodity Futures Prices, WPI- Wholesale Price Index, CPI- Consumer Price Index, IIP- Index of Industrial Production, NIFTY 50- benchmark of Indian stock market index, M3- Broad Money, MIBOR- Mumbai Inter-Bank Offer Rate and ER is USD-INR; u is the error term and t represents time.

10. Price Trend Pattern of Commodities

One basic analysis tool that helps investors quickly understand the movements in commodity prices is the line graph. Additionally, it facilitates the tracking of changes across both short and long-time horizons.



Figure 1: Aluminium



Figure 2: Copper

Sources: www.mcxindia.com



Figure 3: Cotton



Figure 4: CPO

Sources: www.mcxindia.com



Figure 5: Crude Oil



Figure 6: Gold

Sources: www.mcxindia.com



Figure 7: Lead



Figure 8: Natural Gas

Sources: www.mcxindia.com

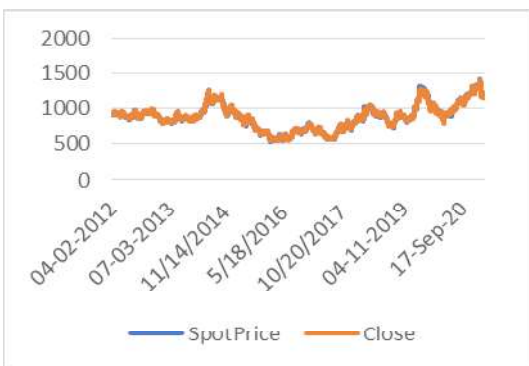


Figure 9: Nickel



Figure 10: Silver

Sources: www.mcxindia.com



Figure 11: ZINC

Sources: www.mcxindia.com

11. Analysis of Trending Pattern of Commodity Futures in India

The figures 1-11 indicates the trend line of spot and futures prices of all the selected commodities from MCX iCOMDEX Composite index. From these, figures, it can be seen that almost in all commodities, future prices move along with its spot prices. This provides a broad overview of commodity spot and futures price trends over the past decade for these commodities that were chosen and traded. Reason for the increase in prices for both the metals i.e., gold and silver during the mid-year of 2020 is the coronavirus pandemic. COVID-19 induced uncertainty on the global economy, attracting investors betting on these safe heaven assets. In 2020, the COVID-19 pandemic caused governments to suspend businesses and restrict travel, which sharply decreased the demand for oil globally. The pandemic caused an unparalleled demand shock in the oil sector, which caused oil prices to plummet. Aluminium prices are also on the rise because it is one of the most in-demand commodities worldwide, including

Table 1: Correlation Matrix of Seven Macroeconomic Variables

	WPI	IIP	CPI	ER	M3	NIFTY 50	MIBOR
WPI	1.000						
IIP	0.697*	1.000					
CPI	0.897**	0.809**	1.000				
ER	0.854**	0.774*	0.968**	1.000			
M3	0.822*	0.996**	0.987**	0.914**	1.000		
NIFTY50	0.911**	0.856**	0.979**	0.920**	-0.981**	1.000	
MIBOR	-0.795*	-0.679*	-0.946**	-0.886**	-0.883**	-0.908**	1.000

Source: NSE, RBI, FBIL, NSO, Office of Economic Adviser

Note: * 5% significance, ** 1% level of significance

in a developing nation like India. In addition to global causes, the expansion of the industrial sector in India drives up the demand for zinc, which keeps prices on an upward trajectory. Similarly, Copper and CPO show a constant trend in their prices till mid of 2020 and then starts increasing in an increasing order because of positive news on vaccine development during that period or the world shifting towards cleaner energy sources enabling more than double the use of copper in manufacturing Electrical vehicles. Cotton price is moving within a range of Rs. 15,000 to Rs. 25,000 since 2012 till date. A decrease in the prices of nickel can be observed during 2015-17 because of easing supply disruption concerns and rising stockpiles and weak Chinese demand. The end of 2018 saw a jump in natural gas prices due to low U.S. gas stocks, higher-than-normal electricity usage during a mild autumn, and nuclear power plant outages.

It is evident from table 1 that there is a correlation between the seven macroeconomic indicators, with the exception of CPI, IIP, and WPI, which have strong correlations. The government considered the IIP to be ineffective in measuring industrial growth, whereas the CPI primarily serves as a gauge of consumer spending. WPI was therefore deemed to be the most pertinent variable for the study, and the number of selected macroeconomic factors was decreased from seven to five.

Table 2: Correlation Matrix of Remaining Five Macroeconomic Variables

	WPI	ER	M3	NIFTY 50	MIBOR
WPI	1.000				
ER	0.854**	1.000			
M3	0.822*	0.914**	1.000		
NIFTY50	0.911**	0.920**	-0.981**	1.000	
MIBOR	-0.795*	-0.886**	-0.883**	-0.908**	1.000

Source: NSE, RBI, FBIL, NSO, Office of Economic Adviser

Note: * 5% significance, ** 1% level of significance

The table 2 shows the association among the five macroeconomic variables- WPI, NIFTY 50 spot price, INR-USD, M3 and MIBOR. All the variables are highly correlated. (Garg *et al.*, 2023) also revealed that exchange rate negatively impacts the nifty financial services sector. However, the exchange rate plays a significant role in country's trade performance, thereby regarded as one of the vital macroeconomic indicators. Also, most of the metal and energy related commodities are imported by India which influences the exchange rate. Economists use M3 to quantify the total amount of money in an economy, and central banks use it to formulate monetary policy that controls growth, inflation, consumption, and liquidity across medium- and long-term timeframes. Interest rates are significant because they draw investors into the commodity market due to the better return on commodity trading than MIBOR. NIFTY 50 is an important alternative for investment. In order to examine their influence on commodity futures, WPI, INR-USD, M3, NIFTY 50, and MIBOR are taken into account.

Table 3: Unit Root Test

	<i>Augmented Dickey Fuller</i>				<i>Philips Perron</i>			
	<i>At Level</i>		<i>At 1st Difference</i>		<i>At Level</i>		<i>At 1st Difference</i>	
	<i>t-stat</i>	<i>p value</i>	<i>t-stat</i>	<i>p value</i>	<i>Adj t-stat</i>	<i>p value</i>	<i>Adj t-stat</i>	<i>p value</i>
LNWPI	-2.7466	0.2614	-3.3350	0.1674	-1.6853	0.6653	-3.5530	0.1198
LNER	-3.9420	0.0694	-4.0725	0.0716	-8.3138	0.0013	-7.6571	0.0041
LNNIFTY50	-4.7074	0.0400	-5.8042	0.0241	-2.4569	0.3335	-6.7279	0.0072
LN M3	-3.4741	0.1889	N/A*	N/A*	-6.3603	0.0157	-1.4151	0.7477
MIBOR	-4.3766	0.0549	-2.9140	0.2427	-1.3997	0.7763	-1.3277	0.7897
LNALUMINIUM	-2.9296	0.1532	-52.1792	0.0000	-3.0165	0.1278	-52.3279	0.0000
LNCOPPER	-1.2082	0.9078	-55.2615	0.0000	-1.3682	0.8700	-55.0881	0.0000
LNCOTTON	-2.3489	0.4066	-52.5045	0.0000	-2.4041	0.3772	-52.5088	0.0000
LNCPO	-1.0852	0.9299	-45.7170	0.0000	-1.5281	0.8200	-46.6073	0.0000
LNCRUDEOIL	-2.3195	0.4226	-24.7235	0.0000	-2.5083	0.3240	-47.7643	0.0000
LNGOLD	-1.6605	0.7684	-51.5068	0.0000	-1.7302	0.7377	-51.4072	0.0000
LNLEAD	-3.8124	0.0159	-50.1544	0.0000	-3.6726	0.0243	-50.2142	0.0000
LNNATURAL GAS	-3.9445	0.0106	-45.8697	0.0000	-3.9394	0.0108	-45.9021	0.0000
LNNICKEL	-1.8401	0.6849	-50.4775	0.0000	-1.7302	0.7377	-50.5148	0.0000
LNSILVER	-1.7735	0.7175	-48.5725	0.0000	-1.7994	0.7050	-48.5707	0.0000
LNZINC	-2.4230	0.3673	-52.2520	0.0000	-2.6176	0.2724	-52.1026	0.0000

Source: NSE, RBI, FBIL, NSO, Office of Economic Adviser, MCX

In Table 3, the Log of WPI, Log of INR-USD, Log of M3, Log of NIFTY 50 and MIBOR and Log value of commodities i.e., Aluminium, Copper, Cotton, Crude Palm Oil (CPO), Crude Oil, Gold, Lead, Natural Gas, Nickel, Silver and Zinc futures prices are tested for unit root with ADF and PP tests.

The results indicate that the macroeconomic indicators, LNWPI is non-stationary at level as well as at 1st difference under both the methods. Whereas, LNER is found to be stationary at 10% level of significance under ADF method and at 1% level of significance under PP test respectively as per level and 1st difference both. LNNIFTY 50 can be seen stationary at 5% level of significance under ADF method at both level and 1st difference, whereas, under PP test it is stationary at 1st difference only with p value of 0.0072. The significance of the ADF t-statistics at the 10% level of significance, with a p-value of 0.0549 (at level), clearly shows MIBOR. Lastly, it is observed that at level, LNM3 is non-stationary in ADF test and stationary at 5% level of significance under PP test with p value of 0.0157. Thus, from the results of unit root test of macroeconomic variables it is concluded that the variables, all the variables except WPI is not considered for the study as it is not stationary.

With the exception of LnLead and LnNatural Gas, which were stationary at a level in both the tests at 5% level of significance, similar results were obtained for the log of other commodity futures prices. Nonetheless, at a 1% level of significance, the reliability of t statistics and adjusted t-statistics

demonstrated that the log of each chosen commodities futures price series is stationary at first difference. As a result, the first difference series of all commodities is used for analysis in commodity futures prices.

Thus, the impact of MIBOR and Log of INR-USD, NIFTY50, M3 on Log value of iCOMDEX commodities Aluminium, Copper, Cotton, Crude Palm Oil (CPO), Crude Oil, Gold, Lead, Natural Gas, Nickel, Silver and Zinc futures prices are examined using their daily trading data through the multiple regression. The equation is:

$$\text{LNCFP}_t = \alpha_0 + a_1 \text{MIBOR}_t + a_2 \text{LNER}_t + a_3 + a_4 \text{LNNIFTY50R}_t + u_t \quad (4)$$

Where α_0 is the constant, a_1, a_2, a_3 is the coefficient, u is the error term, and t is the time. The log of commodity futures prices is represented by LNCFP, the log of NIFTY 50 by LNNIFTY50, the log of broad money supply by LNM3, the Mumbai Inter-Bank Offer Rate (a proxy for interest rate) and LNER is the log of exchange rate.

Table 4: Regression of Macroeconomic Variables on Commodities Futures

	CONSTANT	LNER	LNNIFTY50	LNM3	MIBOR	R ²	Adj R ²	p value
LNALUMINIUM	-10.416 (-3.383)	-1.829 (-4.286)	-1.310 (-1.688)	4.380 (3.768)	0.681 (2.323)	0.967	0.902	0.064
LNCOPPER	-13.862 (-3.860)	-3.036 (-5.517)	-3.122 (-3.120)	7.068 (4.716)	1.466 (3.883)	0.946	0.837	0.106
LNCOTTON	-14.811 (-5.745)	-1.758 (-4.602)	-4.531 (-6.523)	7.463 (7.714)	0.882 (3.366)	0.974	0.921	0.052
LNCPO	-14.148 (-2.356)	-1.700 (-1.868)	-3.642 (-2.201)	6.605 (2.666)	0.929 (1.488)	0.851	0.554	0.275
LNCRUDEOIL	-30.388 (-5.815)	-1.914 (-5.876)	-2.970 (-5.014)	5.671 (6.393)	1.733 (7.754)	0.981	0.943	0.038
LNGOLD	-3.383 (0.867)	-2.331 (-2.101)	-4.398 (-2.180)	6.828 (2.260)	-0.135 (-0.177)	0.779	0.337	0.393
LNLEAD	-10.806 (-3.187)	-1.693 (-3.449)	-2.237 (-2.505)	4.943 (3.697)	0.400 (1.186)	0.957	0.870	0.085
LNNATURAL GAS	-20.072 (-2.232)	-1.146 (-1.224)	-2.290 (-1.345)	5.252 (2.060)	2.063 (3.211)	0.842	0.527	0.290
LNNICKEL	-51.157 (-0.894)	-0.683 (-0.572)	-4.002 (-1.844)	3.975 (1.223)	-0.732 (-0.894)	0.744	0.232	0.446
LNSILVER	-1.746 (-0.258)	-1.563 (-2.145)	-2.615 (-1.973)	3.138 (1.581)	-0.138 (-0.276)	0.905	0.714	0.182
LNZINC	-21.586 (-0.430)	-1.515 (-1.296)	-0.217 (-0.102)	1.907 (0.599)	-0.367 (-0.457)	0.755	0.264	0.431

Source: NSE, RBI, FBIL, NSO, Office of Economic Adviser, MCX

Note: () denotes 't' statistics.

The impact of the macroeconomic variables LNER, LNNIFTY50, and MIBOR on the log futures prices of 11 commodities (Aluminium, Copper, Cotton, Crude Palm Oil (CPO), Crude Oil, Gold,

Lead, Natural Gas, Nickel, Silver, and Zinc) is displayed in Table 5. The aluminium futures price log value exhibits a strong influence, with a maximum of 4.380 units of positive changes in M3 at 5% level. The macro-economic variables i.e., LNER, LNNIFTY50, LNM3 and MIBOR explains 90.2% of impact on the aluminium futures prices. Aluminium is an important and valuable commodity as it is widely used for industrial manufacturing.

Crude Oil futures prices also show significant influence at 5% level of significance. M3 and MIBOR are positively influencing the crude oil futures prices with 5.671 and 1.733 units of change respectively. Whereas ER and NIFTY 50 both are negatively influencing the futures prices of copper with -1.914 and -2,970 units respectively. Crude oil is one of major resources of energy. It is a vital commodity for the country whose output is used for household as well as industrial purposes. India is the world's largest importer of edible oils and is probably going to stay that way in the future, thus the exchange rate will continue to have an adverse effect on the pricing. So combinedly all the macro-economic variables explain 94.3% of impact on the crude oil futures prices.

The 10% significance criterion for the log of Cotton and Lead futures prices also reveals a noteworthy influence of macroeconomic factors. The t-statistics are used to determine which macroeconomic variable has been impacted most. Thus, among the Exchange rate, Nifty 50, M3 and MIBOR, the influence of M3 is significantly more on both Cotton and Lead futures prices with 7.463 and 4.943 t-statistics respectively, followed by MIBOR with 0.882 and 0.400 t-statistics respectively. Comparably, log of Lead futures prices has significant positive influence of 4.943 units from M3 and 0.400 units from MIBOR, while -1.693 and -2.237 units of negative changes from Exchange rate and NIFTY50 respectively.

The log futures prices of Copper, CPO, Gold, Natural Gas, Nickel, Silver and Zinc has no significant impact of selected macroeconomic variables. Thus, the null hypothesis is accepted for these futures prices where as it is rejected for Aluminium, Cotton, Crude oil and Lead log futures prices showing significant impact of macroeconomic variables such as Exchange Rate, Nifty 50, M3 and MIBOR. It is also analysed from the table that M3 has positive impact on all the commodities futures prices.

12. Conclusion

The Liberalization policy 1991, encouraged imports and exports, which in turn helped the manufacturing sector grow. As a result, assessing the impact of macroeconomic indicators on commodity prices is critical. Over nine years of study period, from April 1, 2012, to March 31, 2021, the effects of the most important macroeconomic variables Exchange Rate (INRUSD) as an illustrative of exchange rate, NIFTY 50 as a different investment avenue, and MIBOR indicated as interest rate on commodity prices were analysed through multiple regression. Aluminium is influenced by Nifty 50 because of its wide trading in NIFTY METAL. Similarly, Crude oil is negatively influenced by Exchange Rate as India is the world's leading importer of edible oils. Lead is mostly influenced by Nifty 50 because Nifty Metal index has delivered over 250% gains since pandemic. These three macroeconomic variables do not influence the commodities i.e., Copper, CPO, Gold, Natural Gas, Nickel, Silver and Zinc. The results are similar with that of (Batten *et al.*, 2010) in case of Gold and Silver, whereas, contradict to

the results of (Ahmed *et al.*, 2020) in case of CPO. Therefore, based on the results, commodities like copper and CPO are unaffected by macroeconomic factors, which are primarily influenced by climate and agricultural output conditions. M3 is more influential when looking at a list of metal commodities that are more commonly utilised in industry, such lead and aluminium. Thus, from the analysis it is concluded that the null hypothesis i.e., the macroeconomic indicators significantly impact the commodity futures market gets rejected for Aluminium, Cotton, Crude oil and Lead and accepted for Copper, CPO, Gold, Natural Gas, Nickel, Silver and Zinc.

Therefore, examining the macroeconomic variables effect on Indian commodity futures prices gives a perception towards how external macro variables affect commodity pricing. Macroeconomic factors impact economic development, which must be integrated with the external market to function well. However, in emerging nations like India besides these selected variables, additional economic factors like GDP growth rate, international commodity prices, international stock indices, etc may also have its impact on the commodity futures prices. This study will provide a guideline to all stakeholders, portfolio managers, and market participants to gauge the risk of volatility in commodity futures. The study paves way to further research taking other index constituent commodities of MCX and NCDEX into consideration with other influencing macro-economic factors as well.

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Does Satisfaction Control Switching Intention? A Post-Adoption Study on Consumer Behaviour of Mobile Banking Services in India

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Consumer satisfaction, Switching intention, Mobile banking, Post-Adoption behaviour, M-banking.

JEL Classification

C12, D12, G21, M00, C89.

Abstract: Indian digital banking has grown exponentially, with mobile banking playing a crucial role. Financial Firms are investing more in digital banking than traditional banking. Earlier research on the post-adoption of mobile banking has shown that the majority of consumers are satisfied with mobile banking, and stated that satisfaction is proportional to continuous intention. That is, satisfaction had a negative impact on switching intention. However, the current study shows that consumers are satisfied but yet want to switch from mobile banking to other alternatives such as third-party company UPI payments and mobile wallets. Greater capability and advanced features, ease of use and convenience were the major variables attributed to the shift. The study proposes conceptual framework with service quality, intention to use/use, information quality, satisfaction, and switching intention. This study analyses how these factors influence mobile banking customer satisfaction and switching intention. This study helps banks assess consumer expectations, improve mobile banking service and features, and reduce customer switches.

1. Introduction

Due to the tremendous drive by the Government of India's "Digital India" program, India has seen exponential development in digital payment transactions in recent years (Bhavsar and Samanta, 2021). In digital payments growth, mobile banking playing a crucial role. Mobile banking is the combination of digital currencies and mobile communication services by mobile telecom providers and financial institutions (banks). Mobile banking enables you to access your bank account information, bank and securities, account transfers, payments, security trading, transaction history, and other financial services from your mobile device. Smartphone users can perform financial payment services from anywhere by using the mobile banking payment system, which binds bank cards and credit cards to a phone number.

The convergence of mobile phones and financial organizations has formed digital payment networks that are substituting physical currencies (Sharma *et al.*, 2018). Mobile payments are increasing rapidly and impacting people's lives; this is a turning point in human history. Physical payments are being supplanted by mobile-based virtual payments (Thakur & Srivastava, 2014). Non-cash transactions reached 539 billion in 2016- 2017, with developing Asian markets gaining 32% (Capgemini, 2019). Governments, especially in emerging economies, promote digital payments due to changing technology. The Indian central bank is building convenient, rapid, secure, and low-cost payment infrastructure to promote digital payments. These projects boost retail digital payment systems. From October 2018 to September 2019, digital payments made up 96% of all non-cash payments made at retail establishments (PR News 2019). India has 26% of the world's mobile subscribers. Mobile payments have the opportunity for growth. India uses cash everywhere, including marketplaces, restaurants, and real estate. India demonetized its currency on November 8, 2016, declaring 86% of banknotes were unusable. Since then, digital transactions in India have exploded (Singh *et al.*, 2017). Several variables influence mobile banking adoption. Post-adoption satisfaction is crucial. Because of increasing competition and customer awareness threaten all banks. Customers display logical behaviour while purchasing products or services due to choices (Kompalli and Tharimala, 2022). Several researches have examined mobile banking services (Alkhowaiter, 2020; Elhajjar and Ouaida, 2020; Ho *et al.*, 2020; Shankar and Rishi, 2020; Singh and Srivastava, 2020). Here, we are establishing one discovery, i.e., post-adoption customers are satisfied, and prior researchers have supplied the relationship that when consumers are satisfied, they wish to continue their intention towards the particular technology, meaning he/she won't switch (Kim and Jindabot; Han *et al.*, 2011). In this work, we test satisfaction and switching intention. We focus on post-adoption behaviour and gather mobile banking users' perspectives; then we create a conceptual model based on five variables on Indian consumer mobile payment usage behaviour. The conceptual model considers service quality, information quality, use intention/usage, satisfaction, and switching intention. Marketers and payment system providers may find this study useful.

2. Study of the Literature and Formulation of Hypotheses

2.1. Mobile Banking

Mobile banking allows consumers utilise their phones for financial tasks. Mobile banking uses mobile internet technology (Chong, 2013). Mobile banking provides interactive banking services via smartphones and mobile apps. Cellphones are mobile banking gadgets. Like other financial services, consumers must trust the new service (Pham and Ho, 2015). This trust could emerge based on the user's mobile device security and privacy (Alalwan *et al.*, 2017). Mobile banking offers mobility and speed over traditional banking services (Al-Jabri and Sohail, 2012). Mobile banking clients are satisfied by information and service quality (Franque *et al.*, 2021; Sharma and Sharma, 2019).

2.2. Theoretical Framework

2.2.1. Information Quality

"Information quality" deals with the quality of info. This variable must be understandable, accurate, and correct to help the user achieve goals. Information quality is used to determine technological intention. This takes a positive outcome on consumer satisfaction (DeLone & McLean, 2003).

Information quality positive outcome on the intention to use and satisfaction, according to Franque *et al.*, 2021; Sharma & Sharma, 2019. By these studies propose testing the following hypothesis:

H1: Information quality has a positive effect on the intention to use of mobile banking services.

H2: Information quality has a positive effect on consumer satisfaction on mobile banking services.

2.2.2. Service Quality

Service quality is the technical services team’s ability to address problems and their attitude toward users. Service quality is used to gauge the desire to use technology. This affects consumer satisfaction (DeLone and McLean, 2003). According to Franque *et al.* (2021), Sharma and Sharma (2019) service quality affects use intention and satisfaction. Franque *et al.*, 2021; Sharma & Sharma, 2019 propose testing the following hypothesis:

H3: Service quality has a positive effect on intention to use of mobile banking services.

H4: Service quality has a positive effect on consumer satisfaction of mobile banking services.

2.2.3. Intention to Use / Use

DeLone and McLean’s (2003) model shows that intention to use affects customer satisfaction. When satisfied, consumers may utilize the product again. In IT, “usage” is often debated. Some studies indicate that if “usage” is optional in an organization, it can be utilized to evaluate IS performance (Franque *et al.*, 2021). Franque *et al.* Hypothesis:

H5: Intention to Use / Use has a positive effect on consumer satisfaction of mobile banking services.

2.2.4. Satisfaction

As established by DeLone and McLean’s model (2003) user satisfaction has an effect on the usage of the system. By the opinions of Han *et al.*, 2011 and Kim & Jindabot, n.d., When a customer is satisfied with a service or product, they will not switch to another service or product. According to the Han *et al.*, 2011 and Kim & Jindabot, n.d., below hypothesis is proposed to be tested:

H6: Satisfaction has a negative effect on switching intention of mobile banking services.

2.2.5. Switching intention

If the customers want to utilize the service again, the service provider benefits; if the consumers want to switch from the service, the service provider suffers (Bansal and Taylor, 1999; Han *et al.*, 2009). The intention to switch is referred to as negative repercussions in this context. This study investigates customer switching intentions in mobile banking services.

All hypotheses are shown in a conceptual framework (Figure 1).

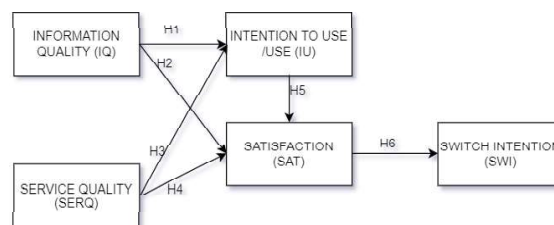


Figure 1: The Conceptual Model

3. Methodology

3.1. Population and Sample

The sample of internet users was collected through the convenience sampling method. A snowball approach was adopted to boost sample unpredictability, with participants requested to pass the survey on to others. Because of the open recruitment technique, the response rate is unknown. However, 207 questionnaires were submitted, and 12 were deleted because they were incomplete, resulting in a 94.202 percent acceptance rate.

3.2. Measurements

Each component and outcome variable were assessed using five-point Likert scale. All scales showed a value of greater than 0.774, suggesting that no adjustments were required for internal consistency.

3.3. Data Collection

The researcher created a Google form to collect data. Data was collected over a two-month period in 2022 by sharing the Google form over social media platforms such as Telegram WhatsApp, and Facebook.

3.4. Data Analysis

The data was examined using SEM in SPSS-AMOS, and the results were reviewed using Byrne's standard criteria and interpretations (Byrne,2016). Exploratory Factor Analysis (EFA), the first step in developing the measurement model, was carried out at the beginning. The structural model was subsequently tested using Confirmatory Factor Analysis (CFA).

4. Empirical Results

4.1. Data Reliability and Validity

Cronbach's alpha reliability testing was employed to ensure the internal consistency of the data. The degree to which a measure generates consistent results and is error-free is referred to as its reliability (Hair *et al.*, 2010). According to Cronbach's α is 0.908, indicating that the study's data is reliable. The KMO method is used to assess sample adequacy. KMO is equal to 0.895. This shows that the sample size is adequate and that the responses are valid and suited for the study.

Table 1: Reliability and Validity Statistics

<i>Cronbach's alpha</i>	<i>No of Items</i>	
0.908	16	
KMO & Bartlett's Test		
Kaiser-Meyer-Olkin-Measure of Sampling Adequacy		0.895
	Approx. Chi-Square	1869.335
Bartlett's Test of Sphericity	Df.	120
	Sig.	0

EFA used the varimax rotation technique for principal component factor analysis on the 16 items. The criteria of item-to-total correlation (> 0.6) was adopted. All items fit this requirement; nonetheless, due to their face validity, they were kept for additional examination. An EFA using all 16 items suggested five factors that account for 76.195 percent of the overall variation. EFA is described in depth in Table 2. Service quality (SERQ) was taken largest share, 18.702%, of the total variance that existed between the five categories. Satisfaction (SAT) accounted for 16.420 %. The variance was accounted for by information quality (IQ), which accounted for 13.914 %. Switching intention accounts for 13.792 %. The intention to use explained 13.407 % (IU).

Table 2: Factor Loading after Varimax Rotation

<i>Factors</i>	<i>Variable labels</i>	<i>Variable factor loading</i>	<i>Variance %</i>
Information Quality	IQ1	0.745	13.914
	IQ2	0.689	
	IQ3	0.753	
Service Quality	SERQ1	0.804	18.702
	SERQ2	0.719	
	SERQ3	0.788	
	SERQ4	0.81	
Intention to Use	IU1	0.731	13.407
	IU2	0.666	
	IU3	0.784	
Satisfaction	SAT1	0.72	16.42
	SAT2	0.828	
	SAT3	0.798	
Switching Intention	SWI1	0.806	13.752
	SWI2	0.897	
	SWI3	0.761	
		Total	76.195

Table 3 shows that CR is larger than 0.70 for all constructions, with AVE values ranging from 0.566 to 0.782. Test of discriminant validity was conducted using the method set forward by Fornel and Larcker (1971), in which “correlation coefficients (off-diagonal) for each construct in relevant rows and columns were compared to the square root of each AVE in the diagonal”. Here are a few disputes between the “Information quality – Intention to Use, Information quality – Satisfaction, and Intention to Use – Satisfaction” constructs. The difference, however, is too minor, at 0.003, 0.001, and 0.006, respectively, and may be ignored (Ab Hamid *et al.*, 2017; Rahim and Magner, 1995). Therefore, discriminant validity is acceptable for this measuring approach and supports discriminant validity between the components.

Table 3: Composite Reliability (CR), Average Variance Extracted (AVE) Square Root (bold), and Construct-to-construct Correlation (off-diagonal)

<i>Latent Constructs</i>	<i>Latent Constructs</i>						
	<i>CR</i>	<i>AVE</i>	<i>Information quality</i>	<i>Service quality</i>	<i>Intention to use</i>	<i>Satisfaction</i>	<i>Switching intention</i>
Information quality	0.775	0.566	0.752				
Service quality	0.865	0.617	0.551	0.786			
Intention to use	0.843	0.641	0.755	0.675	0.8		
Satisfaction	0.914	0.782	0.753	0.65	0.806	0.884	
Switching int.	0.792	0.58	0.34	0.315	0.303	0.363	0.762

As shown in Table 4, the loading of all 16 items with loadings ranging from 0.657 to 0.893 are significant. Confirmatory component analysis (CFA) was used to determine whether the operation correctly measured its variables by measuring their uni-dimensionality. Every unit of measurement has a relatively moderate standard weight in addition to a significant loading on the associated constructs (Table 4 & Figure 2). The validity constructs are determined in according to the recommendations of (Hair *et al.*, 2010), which indicates factor loading of more than 0.50 is acceptable. The Comparative Fit Index (CFI) has a critical value of 0.956, suggesting that the scale is unidimensional (Table 4). The study was subjected to model analysis based on the completion of validity, uni-dimensionality, reliability criteria, and multicollinearity.

Table 4 :Regression Weights

	<i>Standardised regression weights</i>		<i>S.E.</i>	<i>C.R.</i>	<i>P</i>	
IQ1	<—	IQ	0.657			
IQ2	<—	IQ	0.719	0.115	8.394	***
IQ3	<—	IQ	0.865	0.118	9.354	***
SERQ1	<—	SERQ	0.77			
SERQ2	<—	SERQ	0.771	0.084	10.767	***
SERQ3	<—	SERQ	0.782	0.093	10.931	***
SERQ4	<—	SERQ	0.819	0.099	11.466	***
IU1	<—	IU	0.774			
IU2	<—	IU	0.856	0.096	12.185	***
IU3	<—	IU	0.768	0.092	10.889	***
SAT1	<—	SAT	0.893			
SAT2	<—	SAT	0.874	0.053	17.094	***
SAT3	<—	SAT	0.886	0.051	17.525	***
SWI1	<—	SWI	0.772			
SWI2	<—	SWI	0.837	0.137	9.295	***
SWI3	<—	SWI	0.667	0.124	8.49	***

4.2. Measurement Model Fitness SEM and CFA

To determine the straight impact of the model constructs, CFA and SEM were used to examine the relationships between constructs (Figure 2). As suggested by previous research “The ratio of Chi-square to the degree of freedom (CMIN/df), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA), Root Mean Square Residual (RMR), Normalized Fit Index (NFI), Tucker- Lewis Index (TLI) and Incremental Fit Index (IFI)” were used in the study to evaluate the measurement model’s overall goodness of fit. The measurement model’s overall fit statistics are determined to be reaching their respective critical value (Hair *et al.*, 2010; Hu & Bentler, 1999) indicating a satisfactory model fit as mentioned in Table 5.

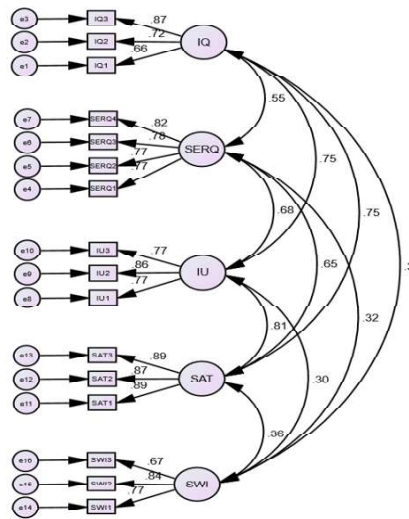


Figure 2: Measurement Mode

Table 5: Model Fit Indices

<i>Fit Index</i>	<i>CFA</i>	<i>Structural Model</i>	<i>Recomanded Values</i>
CMIN/df	1.849	1.816	< 3
CFI	0.956	0.956	≥ 0.95
GFI	0.904	0.903	≥ 0.90
AGFI	0.862	0.864	≥ 0.80
RMSEA	0.066	0.065	< 0.08
RMR	0.044	0.049	< 0.10
NFI	0.910	0.909	> 0.90
TLI	0.994	0.946	≥ 0.90
IFI	0.957	0.957	≥ 0.90

4.3. Structural Model Hypothesis Testing

The structural model's parameters were estimated using SEM (Figure 3), and standardized solutions generated using the maximum likelihood of the AMOS approach are provided in Table 6. The path coefficients (β weights) of the model are investigated to determine the degree of relationship between the components.

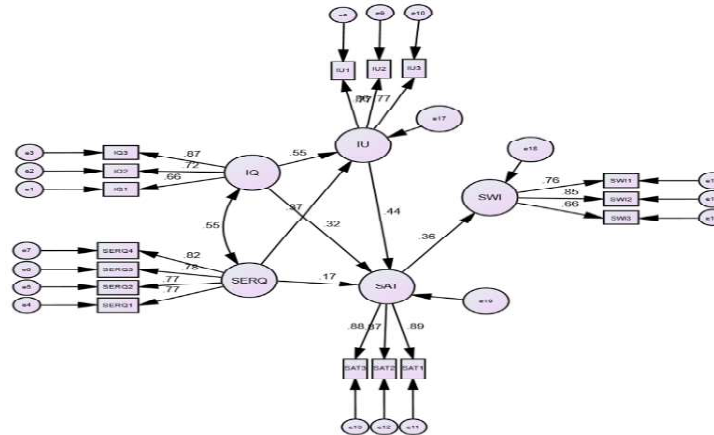


Figure 3: Structural Equation Model

The conceptual model provided a total number of six paths, all are found to be significant; “the path from information quality (IQ) to intention to use (IU) ($\beta = 0.549, P < 0.001$)”, “the path from service quality (SERQ) to intention to use (IU) ($\beta = 0.373, P < 0.001$)”, “the path from information quality (IQ) to satisfaction (SAT) ($\beta = 0.323, P = 0.001$)”, “the path from service quality (SERQ) to satisfaction (SAT) ($\beta = 0.175, P < 0.05$)”, “the path from intention to use (IU) to satisfaction (SAT) ($\beta = 0.445, P < 0.001$)”, “the path from satisfaction (SAT) to switch intention (SWI) ($\beta = 0.365, P < 0.001$)”. Hypothesis H1, H2, H3, H4, and H5 were statistically supported by these results. However, H6 was not a supported hypothesis. The H6 hypothesis was rejected showing that Satisfaction has a positive impact on Switching intention. Table 6 illustrates the summary of this conceptual model.

Table 6: Summary of Hypotheses Test

			Estimate	S.E.	C.R.	P	Results of Hypothesis Testing
IU	<—	IQ	0.51	0.089	5.728	***	Supported
IU	<—	SERQ	0.303	0.067	4.515	***	Supported
SAT	<—	IQ	0.385	0.12	3.224	**	Supported
SAT	<—	SERQ	0.182	0.081	2.241	*	Supported
SAT	<—	IU	0.572	0.149	3.849	***	Supported
SWI	<—	SAT	0.325	0.074	4.404	***	Not Supported

*** represents $P < 0.001$, ** represents $P < 0.01$, * represents $P < 0.05$ ***

5. Discussion

5.1. Hypothesis Discussion

We developed a conceptual model to figure out the connections between these five factors: information quality, service quality, intention to use, satisfaction, and switching intention. The study gives support to hypotheses 1, 2, 3, 4, and 5, but not to hypothesis 6.

We come to the conclusion that information quality has a positive effect on both the intention to use mobile banking services and the satisfaction with those services. Similarly, service quality has a positive effect on both the intention to use mobile banking services and the satisfaction with those services. All these findings are similar to previous research, e.g. (Franque *et al.*, 2021; Sharma & Sharma, 2019). The H5 supported by the statistical results, i.e., positive effect happened by intention to use / use to the satisfaction of mobile banking services, is comparable with other studies e.g., (Franque *et al.*, 2021). Hypothesis H6 is not supported by the statistical results, i.e., satisfaction is found to have a positive effect on the switching intention of mobile banking services. This is in contrast to studies by Kim and Jindabot, n.d. and Han *et al.* (2011). The relationship between these two variables is significant, and hence we argue that satisfied customers are also willing to switch from mobile banking. This association has various causes. When banks implement mobile banking, consumers are more likely to convert from physical banking to mobile banking, even if they are satisfied with physical banking transactions. Mobile banking is easy to use, saves a lot of time, and meets almost all needs. But UPI payments and mobile wallets have increased capabilities such as internal money transfers, recharging, value-added services, payments by QR code and mobile numbers, etc., so another move is expected.

5.2. Theoretical Contribution

Even when satisfied with mobile banking, people would rather switch, the research concluded. We believe that consumer satisfaction is not permanent and that innovations and feature advancements are the only way forward. This applies to mobile banking and all business applications; therefore, companies must adopt new technology for sustainability.

5.3. Managerial Implications

This study shows how information and service quality affect consumer usage and satisfaction. These factors affect usage intention and satisfaction. In response to consumer demands, managers must continuously improve information and service quality. Mobile banking customers are satisfied with their services, although they would like UPI payments and mobile wallets since they offer value-added features and real-time convenience. Mobile banking service providers should improve consumer perception of their services to reduce consumer switching and boost customer satisfaction. Investment bankers should offer some services for free to reduce customer switching.

6. Conclusion and Limitations of the Study

The findings confirm that information quality, service quality, and intention to use/use positively increase satisfaction. Customer satisfaction doesn't prevent consumers from switching to better options.

This contradicted previous studies that said satisfied customers wouldn't switch. Customers are satisfied with mobile banking, but they want to switch to mobile wallets and UPI payments. This study is limited to mobile banking customers in India; future research can be done in other countries. This study isn't limited by age, but future research could be. Information and service quality are independent variables; future studies may add other variables. Future studies may use other methodologies to study the impact of other variables.

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2020	KIIT University, Bhubaneswar	Prof. Pradipta Chandra Tripathy Prof. Malay Kumar Mohanty
2021	L. N. College, Jharsuguda	Prof. Sambhu Prasad Mishra Prof. Damodar Biswal
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22.	2000	Ispat College, Rourkela	Sri Minaketan Mohapatra Principal, Dehenkanal College	Malay Kumar Mohanty, Ravenshaw College (Auto)	Prof. Pramod Ku. Sahu, Berhampur University	One Issue
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